PFAS OMP - 2021 Annual Interpretive Report

HMAS Stirling

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Prepared for
Department of Defence

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Cardno

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Executive Summary

Introduction

Cardno, now Stantec, was engaged by the Australian Department of Defence (the Client) to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) (RPS, 2018c)[1] at the Australian Naval Base His Majesty's Australian Ship (HMAS) Stirling, Western Australia.

The PFAS OMP outlines the rationale and scope for the monitoring of the concentrations and extent of PFAS in groundwater, porewater, surface water and sediment originating from HMAS Stirling on Garden Island (the site). The site is shown on Figure 1 in Appendix A of this report. The OMP includes sampling and analysis not only from Garden Island, but also from the marine nearshore environment surrounding the island. Garden Island and these surrounding areas are collectively referred to as the Management Area. The Management Area is shown on Figure 2 in Appendix A of this report. The monitoring program consists of quarterly monitoring events at sample collection locations within the Management Area. Sampling under different climatic conditions provides a better understanding of the movement and concentrations of PFAS in the environment.

Objectives

The specific objectives in the OMP aim to:

- Provide ongoing data on the concentrations of PFAS in groundwater, surface water, sediment and porewater within the Management Area;
- Establish the presence or absence of trends in PFAS concentrations associated with seasonally variable rainfall and consequent changes in groundwater flow direction and height; and
- Confirm the level of risk described in the detailed site investigation (DSI) and environmental risk assessment (ERA).

2020 – 2021 Monitoring Program Results

The scope of work for the quarterly monitoring events included monitoring of 61 groundwater wells, 39 sediment locations, 39 porewater locations and 28 surface water locations for PFAS concentrations as specified in the Sampling and Analysis Quality Plan (SAQP) (Cardno, 2021). Works were conducted in general accordance with the SAQP (Cardno, 2021) except as summarised in Section 3.7 of this report.

The monitoring results showed that overall, the concentrations of PFAS at each monitoring location generally remained within the same order of magnitude as those recorded in previous monitoring rounds. Results from previous monitoring rounds can be found in the 2020 Annual Interpretive Report as well as the DSI (RPS, 2018a).[2]

What is an 'order of magnitude'?

This refers to something decreasing or increasing by multiples of ten. For instance, an increase from 10 to 100 is an order of magnitude increase. When assessing changes in PFAS concentrations at an individual location, all concentrations are considered when determining trends, but order of magnitude changes are discussed separately as they represent a significant change in concentrations from what was reported in the previous event.

If a change is close to established health or environmental criteria, it will also be considered significant.

Groundwater results

Groundwater Flow Direction

Groundwater levels within monitoring wells and groundwater flow direction for the monitoring period were consistent with historical results. Groundwater levels in wells close to the shoreline are expected to increase and decrease throughout the day due to the influence of the nearby tide. Geochemical parameters of groundwater (including but not limited to pH, dissolved oxygen concentration, conductivity) showed no notable change across the different seasonal sampling events. The salinity in groundwater was observed to increase the closer the monitoring wells were to the coastline.

[1] The OMP is publically available at www.defence.gov.au/environment/pfas/Stirling/publications.asp, and is found as Attachment 1 of the PFAS Management Area Plan.
[2] Publically available at www.defence.gov.au/environment/pfas/Stirling/publications.asp

PFAS Concentrations

PFAS concentrations measured within the groundwater were primarily within the same order of magnitude and generally consistent with the historical data. This indicates that there are no changes in the nature of PFAS in groundwater.

As identified during the DSI, PFAS plumes are present in some locations. PFAS plumes are identified as localised areas of PFAS contamination that slowly moves with the groundwater away from the source areas.

To determine the stability and extent of potential PFAS plume migration in groundwater, statistical analysis (Mann-Kendall) was undertaken within the Management Area. This showed a significant statistical trend indicating the groundwater plume was migrating towards the coastline. This trend is supported by sampling conducted at coastal locations that showed new concentration exceedances (above guideline values).

PFAS concentrations ranged from below the laboratory Limit of Reporting (LOR, 0.01 ug/L), and two orders of magnitude above the HEPA (2020) recreational groundwater use criteria (2.0 µg/L). Groundwater results were observed outside of the historical concentration range (i.e. the data set had new minimum concentrations and new maximum concentrations) at select locations within all monitoring areas. However, these were generally isolated occurrences, as PFAS concentrations often returned to the historically observed range during the following monitoring round.

The 2020-2021 groundwater data confirms the current understanding of the risk for the Management Area, which is that it is low and acceptable for human health and ecological receptors.

What is a 'limit of reporting'?

The limit of reporting (LOR) is the lowest concentration level that the laboratory is able to measure in a sample with a reasonable degree of certainty. Where monitoring shows <LOR, it means that if PFAS is present in the sample it is too low for the laboratory to measure with any degree of certainty.

Porewater results

Porewater is water that is present between the individual grains of sand in the ground. It differs from groundwater as there is a mix of both water and air pockets between the individual grains of sand. At a point that all the air is replaced by water, the soil is considered saturated, and the water is termed 'groundwater'. The monitoring of porewater provides data to assess the potential risk of PFAS in porewater migrating to the surrounding waters off Garden Island.

PFAS concentrations in porewater ranged from below the laboratory LOR to 3.16 µg/L across the Management Area. However, the concentrations of PFAS in porewater across the Management Area generally indicated that the PFAS groundwater plume is being diluted due to the nearby coastal tides.

The HEPA (2020) recreational use criterion (2.0 ug/L) was exceeded in porewater downgradient of the accommodation on-site in December 2020. The exceedance was less than one order of magnitude above the criteria and decreased in the subsequent monitoring events to below the recreation criterion. It is expected that dilution will occur with sea water and given the isolated occurrence it is not considered that an exposure pathway is present. However, ongoing monitoring at this porewater location and nearby surface water locations will be continued to assess the potential risk to human health and/or the environment.

In addition, a number of first-time detections and new concentration maximums of PFAS were reported at select porewater and surface water monitoring locations within three of the PFAS source areas (see Section 2.5 within this report for the listed source areas). The three areas were the Helicopter Support Facility (HSF), fire training area (FTA), and waste water treatment plant (WWTP). The location of the samples in reference to the source areas indicates PFAS migration towards the coastline. For most monitoring locations, the first-time detections were one-off, followed by results below the LOR during the following monitoring event. This indicates that dilution is occurring.

Statistical trend analysis was not undertaken for the porewater monitoring results due to the majority of the results being below laboratory LOR. No changes or trends in PFAS concentrations were noted for the porewater monitoring locations albeit occasional detections above the LOR.

Surface water results

PFAS concentrations in surface water ranged from below the laboratory LOR to 0.37 µg/L [exceedance of the HEPA (2020) ecological criteria for 99% species protection for Perfluorooctane sulfonic acid (PFOS) (LOR value adopted)]. Findings are consistent with the ERA (RPS, 2018b)[2] conclusion that PFOS concentrations measured at that time would increase in the future.

Statistical trend analysis was not undertaken for the surface water monitoring results due to the majority of the results being below laboratory LOR. No changes or trends in PFAS concentrations were noted for the surface water monitoring locations albeit occasional detections above the LOR.

It is noted that a number of first-time detections and new concentration maximums of PFAS were reported at select surface water monitoring locations at the HSF, FTA and WWTP, indicating evidence of PFAS migration towards the coastline. For most monitoring locations, this was however one-off detections, generally followed by results below the LOR during the following monitoring event, indicating that dilution is occurring.

Sediment results

Sediment is sampled to provide an indication regarding the movement of PFAS in the environment.

The majority of the sediment samples collected during the four events of the monitoring period reported PFAS concentrations below the laboratory LOR. New concentration maximums (including first-time detections) were reported for select locations at the WWTP, FTA and HSF. Whilst they were new maximums at these locations, they are the same order of magnitude as observed in the vicinity during previous monitoring. Subsequent monitoring events also generally showed a return to lower concentrations in line with the historical data range. No changes in the nature and extent of PFAS in sediment were observed. It is interpreted that PFAS are not accumulating within the sandy sediments at the coastline. Dilution of PFAS with porewater/sea water appears to be occurring faster than PFAS can bind with the sediments.

Risk Summary

A review of the sources, pathways and receptors as presented in the PFAS Management Area Plan (PMAP) (Defence, 2019) has been undertaken.

The findings within this report suggest that the nature and extent of PFAS in groundwater, porewater, surface water and sediment has not significantly changed compared to the results from previous reporting. No new pathways, exposure scenarios or potential receptors were identified.

Based on the available data from previous monitoring and the current monitoring period, there is no significant change to the overall risk profile of the Management Area. No elevated risks requiring specific management actions were identified during the DSI (RPS, 2018a) and ERA (RPS, 2018b). The OMP data collected to date doesn't warrant a change to this conclusion. Additionally, based on the interpretive assessment undertaken as part of this report, the monitoring network, frequency, and parameters appear adequate to meet the OMP objectives.

Conclusions

The 2020 – 2021 OMP monitoring was undertaken in general accordance with the SAQP and is considered to have met the objectives of the OMP. Overall monitoring data indicated no significant changes (or no changes) to our understanding of PFAS contamination on the site. The risks to Human Health and Ecological receptors within the Management Area remain low and acceptable.

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Chemical Names

DOC	Dissolved Organic Carbon
DO	Dissolved Oxygen
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Per-fluoro-hexane Sulfonate
PFOA	Per-fluoro-octanoic Acid
PFOS	Per-fluoro-octane Sulfonate
TDS	Total Dissolved Solids (salinity of water)
TSS	Total Suspended Solids

Technical Terms & Abbreviations

AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
AIR	Annual Interpretive Report
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
AST	Above-ground Storage Tank
BGL	Below Ground Level
COC	Chain of Custody
CSM	Conceptual Site Model
DQI	Data Quality Indicator
DQO	Data Quality Objective
DSI	Detailed Site Investigation
EC	Electrical Conductivity
EPA	Environment Protection Authority
ERA	Ecological Risk Assessment
ESA	Environmental Site Assessment
HEPA	Heads of Environmental Protection Authority
LOR	Limit of Reporting
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
PSI	Preliminary Site Investigation
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
RWL	Reduced water level
SAQP	Sampling and Analysis Quality Plan
SWL	Standing Water Level

Units

ha	Hectares
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
mV	Millivolt
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

OMP	Ongoing Monitoring Plan
PMAP	PFAS Management Area Plan
FTA	Fire Training Area
HSF	Helicopter Support Facility
RCIP	Regional Contamination Investigation Program
WWTP	Waste water Treatment Plant

1 Introduction

Cardno was engaged by the Australian Department of Defence to carry out the PFAS OMP quarterly sampling events and annual interpretative reporting at HMAS Stirling ('the site') (Figure 1, Appendix A).

1.1 Background

The PFAS OMP (RPS, 2018c) outlines the rationale and scope for the monitoring of the concentrations and extent of PFAS in groundwater, porewater, surface water and sediment originating from the site. The monitoring program consists of quarterly monitoring events and is implemented for an initial 24-months monitoring period.

The OMP applies not only to the site, but also the surrounding marine nearshore areas that, together with the site, make up the "Management Area". For the purposes of this report:

- The 'site' is defined as HMAS Stirling Garden Island (Figure 1, Appendix A); and
- The 'Management Area' is defined as comprising of Garden Island and the marine nearshore environment (Figure 2, Appendix A).

1.2 Purpose & Objectives

The primary objective of the PFAS OMP is to establish trends in PFAS concentration in groundwater, surface water, porewater and sediment associated with seasonal variability to confirm the current understanding of the risk. To achieve this, the monitoring specified in the OMP aims to:

- Provide ongoing data on the concentrations of PFAS in groundwater, surface water, sediment and porewater within the Management Area;
- Establish the presence or absence of trends in PFAS concentration associated with seasonally variable rainfall and consequent changes in groundwater flow direction and height; and
- Confirm the level of risk described in the DSI and ERA.

The purposes of the Annual Interpretive Report are to:

- Inform Defence and key stakeholders of PFAS trends in surface water, porewater, groundwater and sediment;
- Assess any variations in the distribution of PFAS for the Management Area and how this changes the understanding of the conceptual site model and risk profile; and

Recommendations for any potential changes in the location and frequency of sampling which may be incorporated in the revision of the OMP will be provided to Defence under a separate cover if required.

1.3 Scope of Work

The PFAS OMP was carried out in general accordance with the scope and limitations presented in Cardno's Sampling and Analysis Quality Plan (SAQP):

- Cardno, August 2021, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) HMAS Stirling' (Appendix B).

The SAQP was reviewed prior to each monitoring event. The following changes were made prior to the Q3 2021 monitoring event:

- Laboratory testing for total organic carbon (TOC), total suspended solids (TSS), total dissolved solids (TDS) and pH were removed from the analytical suite for groundwater, surface water and porewater; and
- Laboratory testing for TOC, cation exchange capacity (CEC) and pH were removed from the analytical suite for sediment.

Cardno carried out the following tasks in order to satisfy the purpose and objectives of this assessment:

- Quarterly monitoring of on-site groundwater wells (gauging and sampling); and
- Sampling of surface water, porewater and sediment within the Management Area on a quarterly basis.

The OMP outlines the rationale and scope for the monitoring of the concentrations and extent of PFAS in groundwater, surface water, porewater and sediment originating from the site for an initial 24-months monitoring period. This Annual Interpretive Report (AIR) covers the monitoring period from December 2020 to September 2021.

1.4 Standards of Assessment and Limitations

This interpretive report has been prepared in general accordance with the current industry standards for an assessment of this type for the purpose, objectives and scope identified in this report.

This report is not any of the following:

- A Mandatory Audit Report (MAR) or Voluntary Audit Report (VAR) as defined under the *Contaminated Sites Act 2003* (CS Act).
- A Geotechnical Assessment.
- A DSI.
- A Detailed Hydrogeological Assessment.
- A Remediation Action Plan (RAP) or Site Remediation & Validation (SRV) report.
- A Site Management Plan (SMP).

2 Site Setting

HMAS Stirling is located on Garden Island within Cockburn Sound, situated approximately 4 km off the WA mainland and connected to the mainland via a bridge in the south of the Island. The Island is 12 km long and 1.5 km wide at its widest point and covers an area of 1,274 hectares (ha).

Defence facilities occupy approximately 28% of the Island, with the majority focused around Careening Bay on the south east, with other support facilities located in other portions of the Island.

The buildings and associated infrastructure and support services include:

- Accommodation blocks;
- Helicopter Support Facility;
- Fire Station;
- Fuel Farm;
- Flammable / Hazardous goods and waste Storage;
- AVCAT Storage Facility;
- Waste Water Treatment Plant;
- Seepage ponds;
- Shipping berths and ship sullage area;
- Maintenance and workshop areas;
- Demolition ground; and
- Fire Training Area.

2.1 Site Definition and Planning

The site location is presented on Figure 1, Appendix A. Key site identification details are presented in Table 2-1.

Table 2-1 Site Identification Details

Details	Description
Site Address	Garden Island, WA
Land Description	HMAS Stirling
Owner	Commonwealth of Australia
Title Details	Lot 9 on Plan 226190
Planning Zone / Land use	Public Purposes – Government Services / Naval Base
Local Government Authority (LGA)	City of Rockingham

2.2 Surrounding Land Uses and Zoning

The surrounding land uses are outlined in Table 2-2.

Table 2-2 Surrounding Land Uses

Direction	Land Use
North	Carnac Island Nature Reserve / Indian Ocean
West	Indian Ocean
East	Cockburn Sound / Kwinana Industrial Area
South	Warnbro Sound / City of Rockingham

2.3 Management Area Description

The OMP includes sampling and analysis from a number of groundwater bores, porewater/sediment locations and surface water locations. The Management Area boundaries are presented on Figure 2, Appendix A.

The 'Management Area' as described in the PFAS Management Area Plan (PMAP) (Defence, 2019) includes HMAS Stirling, Garden Island and the near shore marine environment surrounding Garden Island.

2.4 Environmental Setting

Key details defining the site are summarised in Table 2-3.

Table 2-3 Key Site Details

Setting	Description
Climate	The Perth region, including Garden Island has a warm summer, cold winter Mediterranean climate. Mean maximum temperatures on the Island occur in February (28.3 ºC) while mean minimum temperatures occur in July (11.2 ºC). Rainfall is winter dominant, with the highest volume of rainfall typically occurring in July with a mean monthly rainfall amount of 115.5 mm.
Topography	Topography on Garden Island ranges from sea level, 0 meters relative to the Australian Height Datum (mAHD) along the eastern coast line to 55 mAHD within the middle of the Island. Steep dunes and limestone cliffs of up to 10 mAHD characterise the western perimeter of the Island, whilst the eastern perimeter is relatively flat.
Geology	**Regional Geology** Garden Island is an offshore outcrop of Tamala Limestone and part of the Garden Island Ridge, the WA Department of Mines and Petroleum 1:50,000 geological map series indicates the surface is Calcareous Sand (S2 and S13) (i.e. Safety Bay Sand – white medium grained rounded quartz and shell debris well sorted of eolian origin). **Site Specific Geology** Logs from the drilling of groundwater wells and soil cores during previous sampling programs (ENSR 2009, RPS 2018a) indicate the geology of the site varies with topography. The Demolition Ground in the north coast of the Island contains Safety Bay Sand to at least 5 meters below ground level (mBGL), and at the WWTP Safety Bay Sands were encountered down to 29 mBGL. Layers of limestone were encountered in certain areas (e.g. Fire Training Area at 1-2 mBGL and around the WWTP at 7-15 mBGL). Fill sands containing brick rubble and limestone cobbles were also encountered in the Fire Training Area to a depth of 1 mBGL.
Acid Sulfate Soil	A review of the Acid Sulfate Soils (ASS) risk mapping, available on the WA Atlas online database indicates no known risk of ASS occurrence within three meters of natural ground surface for the site
Hydrogeology	▪ **Groundwater Occurrence** – The superficial aquifer at Garden Island, whilst geologically connected, is not hydraulically connected to the superficial aquifer of the mainland as both discharge to the near shore marine environment. The underlying confined aquifers, the Leederville and deeper Yarragadee, typically extend tens of kilometers offshore beneath the seabed and are thought to discharge terrestrial groundwater to the ocean several kilometers from the coast (Davidson, 1995). At the South of the Island the superficial aquifer extends to a depth of around 20 mBGL, with an aquitard (Kings Park Formation) at ~90 mBGL, overlying the Kardinya Shale around 140 mBGL, overlying the Leederville aquifer at ~165 mBGL. In the north of the Island, the Kardinya Shale is present at significantly shallower depth than in the south (~37 mBGL) and forms an aquitard to the deeper Leederville Formation at ~181 mBGL. ▪ **Depth to Groundwater** – The depth to groundwater is affected by the topography of the Island. Along the coast line groundwater is found at shallow depth (2-3 mBGL), whilst around the WWTP groundwater is up to 21 mBGL. The depth to groundwater, especially along the coastal fringes, will be influenced by tides within the surrounding marine environment. ▪ **Groundwater Flow Direction** – groundwater flow direction is interpreted to be towards the marine environment, with flow on the east of the dunal system towards Cockburn Sound and flow towards the Indian Ocean on the west of the dunal system. Tidal pressure can influence localised flow direction in the vicinity of the coastline.

Setting	Description
	▪ **Salinity –** The superficial groundwater is classified as brackish by the DWER Perth Groundwater Atlas, with a total dissolved solids (TDS) in the range of 500 – 1,000 mg/L. ▪ **Groundwater Use** – Groundwater is not abstracted on the Island for potable or non-potable use. Potable water for Garden Island is supplied from the Rockingham town water supply. The DWER groundwater database found two registered abstraction bores (Leederville Aquifer) on the mainland within 20 km of Garden Island. These bores are used for irrigation and industry. RPS ruled out any risk of PFAS impact to these bores according to the calculated groundwater travel time (RPS, 2018a).
Environmental Sensitive Areas	Due to its significant natural and cultural heritage values, the Island is protected by the *Environment Protection and Biodiversity Act 1999* (EPBC Act). Several vulnerable species of flora have also been listed as endangered ecological communities. The vegetation on the Island is also included in Bush Forever Site 63, with the Bush Forever policy providing a framework for bushland protection and management issues in WA. Additionally, the seagrass meadows along the eastern margin of Garden Island are a significant remnant population of seagrass in Cockburn Sound and are protected under the *State Environmental (Cockburn Sound) Policy 2015*.
Further information can be found in the DSI report (RPS, 2018a).	

2.5 Source Areas

Ten main source areas for PFAS contamination were identified during the DSI (RPS, 2018a) and associated with risks to receptors as identified in the PMAP (Defence, 2019):

> FTA;
> HSF;
> Demolition ground;
> WWTP;
> AVCAT storage, fuel farm and infiltration swale;
> Fire station;
> Dredged sediments;
> Ship sullage area;
> Flammable/hazardous goods and waste storage; and
> Accommodation area.

PFAS was detected in all media tested (sediment/surface soils, groundwater and surface water). The highest concentrations in soil were observed in the source areas. PFAS concentrations in groundwater tested during the RPS (2018a) DSI were generally low across the site, with higher concentrations in the immediate vicinity of the source areas. The PFAS source areas identified by RPS are shown on Figure 2, Appendix A.

In addition to the above, GHD identified additional potential source areas through a Stage 1 PSI (GHD, 2020), namely:

> Building 54 Group of USTs; and
> Sewage treatment at the Torpedo Maintenance Facility and Explosive Area E3.

3 Sampling and Analytical Methodology

3.1 2020 - 2021 Sampling Dates

A summary of the monitoring dates for each event of the monitoring period is presented in Table 3-1.

Table 3-1 Summary of sampling dates

Sampling event	OMP activity	Sampling period
2020 Q4 - First Quarterly Monitoring Event	Groundwater monitoring (sampling and gauging)	14 – 16 December 2020
	Surface water, porewater and sediment sampling	
2021 Q1 - Second Quarterly Monitoring Event	Groundwater monitoring (sampling and gauging)	15 - 18 March 2021
	Surface water, porewater and sediment sampling	
2021 Q2 - Third Quarterly Monitoring Event	Groundwater monitoring (sampling and gauging)	8 – 10 June 2021
	Surface water, porewater sediment sampling	
2021 Q3 - Fourth Quarterly Monitoring Event	Groundwater monitoring (sampling and gauging)	30 August - 1 September 2021
	Surface water, porewater and sediment sampling	

3.2 Changes to the Monitoring Network Condition

During the course of the monitoring period, monitoring well MW199 was identified as damaged (bent at 1.5 m below top of casing [mBTOC]) and was subsequently repaired. MW225, MW288, MW214 and MW215 were unblocked with the help of a steel bailer and sampled in Q3 2021. These wells were sampled for the first time in several monitoring rounds. Further information regarding changes to the monitoring network and deviations with the SAQP are found in Table 3-2 in section 3.7.

3.3 Groundwater Sampling

Sampling of selected groundwater monitoring wells was performed in general accordance with the SAQP (Cardno 2021, Appendix B) with the exception of those deviations noted in section 3.7 of this report, applying methods set out in Section 6.2.3 of the SAQP. The groundwater wells monitored as part of the OMP are shown on Figures 3A-F, Appendix A.

3.4 Porewater Sampling

Porewater monitoring and sampling was conducted in general accordance with the SAQP (Cardno 2021, Appendix B), applying methods set out in Section 6.3.4 of the SAQP. The porewater locations monitored as part of the OMP are shown on Figures 3A-F, Appendix A.

3.5 Surface Water Sampling

Sampling of selected surface water monitoring locations was performed in general accordance with the SAQP (Cardno 2021, Appendix B) applying methods set out in Section 6.3.3 of the SAQP. The surface water locations monitored as part of the OMP are shown on Figures 3A-F, Appendix A.

3.6 Sediment Sampling

Sampling of selected sediment monitoring locations was performed in general accordance with the SAQP (Cardno 2021, Appendix B), applying methods set out in Section 6.3.4 of the SAQP. The sediment locations monitored as part of the OMP are shown on Figures 3A-F, Appendix A.

3.7 Deviations from the OMP SAQP

Deviations from the SAQP (Cardno, 2021) for the October 2020 – September 2021 monitoring period are summarised in Table 3-2.

It is noted that the SAQP was updated in August 2021 to remove TOC, TSS, CEC and pH from the groundwater, porewater, surface water and sediment analytical suites. The September 2021 (Q3 2021) monitoring event, therefore, does not include these analytes.

Table 3-2 Summary of deviations from the OMP SAQP

Location	Deviation	Justification/Discussion
First Quarterly Monitoring Event (December 2020)		
MW128, MW147, MW172, MW173, MW197, MW214, MW215, MW220, MW258, MW288	Not sampled	These monitoring wells were found dry. Moderate impact on the OMP as no samples were obtained from numerous locations.
MW123, MW202, MW216, MW196, MW166, MW236, MW249, MW248	Sampled Using a disposable HPDE bailer	Unable to sample with hydrasleeve. No impact on the program, a sample was collected using an alternative methodology.
Second Quarterly Monitoring Event (March 2021)		
MW128, MW147, MW172, MW196, MW214, MW215, MW220, MW225	Not sampled	These monitoring wells were found dry. Moderate impact on the OMP as no samples were obtained from several locations.
MW199, MW258		These monitoring well was found blocked (assumed tree roots). Moderate impact on the OMP as no samples were obtained from several locations (refer to above row).
MW173, MW193, MW236, MW197, MW248, MW288	Sampled using a disposable HPDE bailer	Unable to sample with hydrasleeve. No impact on the program, a sample was collected using an alternative methodology.
Third Quarterly Monitoring Event (June 2021)		
MW128, MW147, MW172, MW258	Not sampled	These monitoring wells were found dry. Limited impact on the program as the number of dry wells was small.
MW199		Monitoring well bent at 1.5 mBGL – unable to repair with a steel bailer.
MW220		Only PFAS sample collected, not enough water column. No impact on the program
Surface water locations	Sampling depth	It was not always possible to position the sample container 10 cm below the surface water level due to the waves. No impact on the program, a sample was obtained.
Fourth Quarterly Monitoring Event (August/September 2021)		
MW128, MW137, MW147, MW172, MW173, MW220, MW248, MW225, MW258	Not sampled	These monitoring wells were found dry. Moderate impact on the OMP as no samples were obtained from several locations
Surface water locations	Sampling depth	It was not always possible to position the sample container 10 cm below the surface water level due to the waves. No impact on the program, a sample was obtained.

4 Quality Control / Quality Assurance

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following data quality indicators, as described in the SAQP:

- QA documentation;
- Bias;
- Data Representativeness;
- Data Precision & Accuracy;
- Laboratory Performance;
- Data Comparability; and
- Data Set Completeness.

4.1 QA/QC Summary

The laboratories have undertaken different QC measures in all sets of sample analysis which validate the accuracy of their techniques. The laboratories are appropriately certified (NATA) for environmental sample analysis. It is considered that the analytical results are accurate and reliable for the purposes of this assessment.

Field quality control protocols were adopted to ensure all samples were collected in accordance with applicable industry standards and guidance, and the methodologies described in the OMP SAQP. The field staff involved in sampling were experienced in performing these duties and complied with the procedures detailed in the sampling plan. Collection of QA/QC samples and calibration of field equipment as well as decontamination practices ensured the samples and field data were collected in a consistent and reliable method.

The data validation process (refer to the factual reports in Appendix C) has concluded that there are no significant systematic errors in the data collection process. Therefore, the data set used as the basis for this assessment is considered valid and complete.

5 Assessment Criteria

5.1 Groundwater, porewater and surface water

The assessment levels adopted for groundwater and surface water in the OMP are based upon the Heads of Environmental Protection Authorities (HEPA) Australia and New Zealand (2020) PFAS National Environmental Management Plan (NEMP) 2.0. These criteria were adopted in relation to the exposure pathways and potential receptors identified in the CSM during the investigation stage (DSI and ERA).

The adopted assessment criteria for groundwater, porewater and surface water are detailed in Table 5-1.

Table 5-1 Criteria for Groundwater, Porewater and Surface water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	µg/L		
Incidental ingestion Human Health – Drinking Water Quality Guideline	0.07[1]	0.56	NHMRC 2019, HEPA 2020
Recreational Use Human Health – Recreational Water	2[1]	10	NHMRC 2019, HEPA 2020
Ingestion/uptake Ecological – 99% species protection	0.00023[2]	19	HEPA 2020

1. Sum of PFOS and PFHxS.
2. PFOS only; Practical screening guideline of 0.01 µg/L is based on typical current laboratory limit of reporting. Therefore, it should be noted that warning and action levels would not be relevant until the detection limits are reduced or the screening levels are increased (HEPA 2020).

PFOS – Per-fluoro-octane sulfonate
PFHxS – Per-fluoro-hexane sulfonate
PFOA – Per-fluoro octanoic Acid

5.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment. As detailed in the SAQP (Cardno, 2021), sediment samples will be assessed with reference to the PFAS NEMP 2.0 (HEPA, 2020) soil criteria for consistency with the DSI (RPS, 2018a). The adopted assessment criteria for sediment are detailed in Table 5-2.

Table 5-2 Criteria for Sediment

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	mg/kg		
Human Health - Commercial / industrial (on-base activities)	20[1]	50	HEPA 2020
Ecological – Direct exposure (interim guidelines)	1[2]	10	HEPA 2020
Ecological - indirect exposure (interim guidelines)	0.01[2]	-	HEPA 2020

1. Sum of PFOS and PFHxS.
2. PFOS only

6 Contextual and Ancillary Information

6.1 Additional Analytical Data

All data available on the ESdat database at the time of reporting for each OMP monitoring location was utilised to form the basis of the interpretations and conclusions presented in this report. This data encompasses all historical data from the groundwater, surface water, porewater and sediment sampling locations. Each sampling location has been monitored for a different time frame with some locations containing historical results from as far back as 2010. This historical data can be found in Table 1-4 of Appendix D. No additional PFAS data outside of the results obtained from the PFAS OMP was provided for the monitoring period.

In addition to the groundwater bores monitored quarterly as part of the PFAS OMP, PFAS testing on groundwater was undertaken in a number of potential PFAS source areas as part of the Stage 1 PSI (GHD, 2019) and Stage 2 DSI (GHD, 2020).

Greencap undertook PFAS testing on all wells in the car park pier area, including newly installed wells, as part of the DSI related to the diesel fuel spill (Greencap, 2019). PFAS were detected above the laboratory limit of reporting (LOR) in all samples which is consistent with the results from the OMP monitoring wells in this area.

6.2 Remediation and Infrastructure Projects

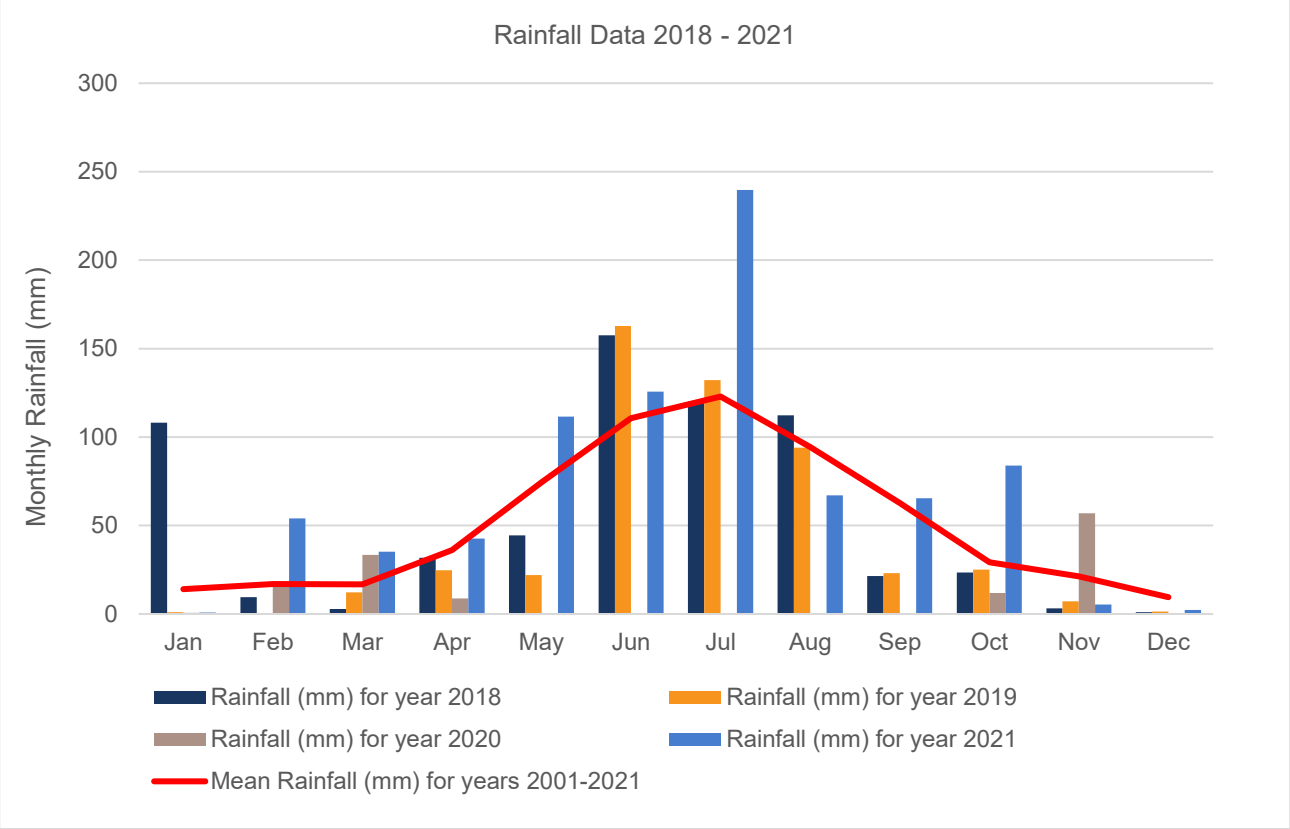
No remediation project or infrastructure works that could affect the interpretation of monitoring results were undertaken at the site during the monitoring period.

6.3 Climate

Rainfall is potentially the most significant meteorological factor that can influence PFAS migration through groundwater recharge and subsequent flow. Monthly rainfall for all months between January 2018 and December 2021 [measured at Bureau of Meteorology (BoM) station 009256, Garden Island HSF] are displayed in Figure 6-1. It is noted some of the rainfall data for 2020 is not available. Significantly more rainfall was reported in February, May, July and September 2021 than in previous years, however, significant changes were not observed in the groundwater levels. This is not expected to have influenced the interpretation of the OMP results.

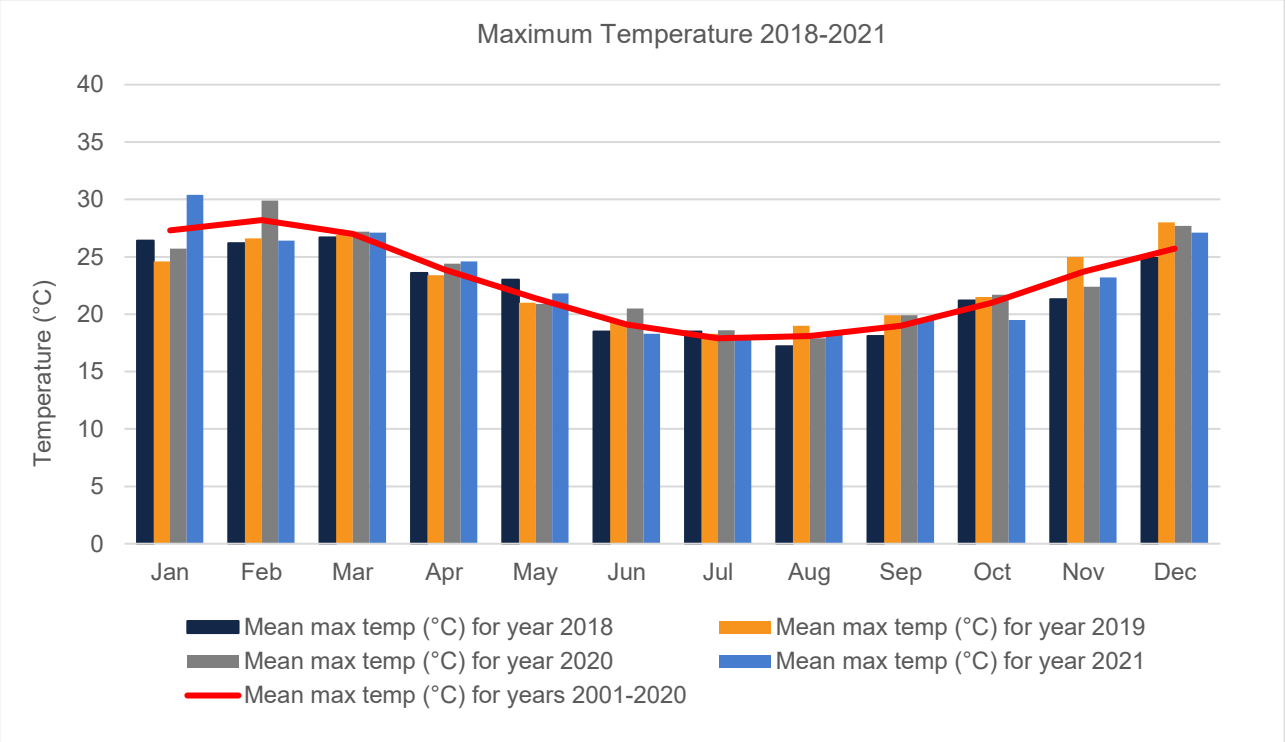
Monthly maximum mean temperatures recorded between 2018 and 2021 are mostly consistent with the monthly mean maximum data (2001-2021), with no noticeable variation recorded during the monitoring period (Figure 6-2).

Figure 6-1 Monthly rainfall and long term mean monthly rainfall for Garden Island HSF (station 009256) (BoM, 2021)



Note: No rainfall data available from BoM from May-September 2020

Figure 6-2 Monthly mean max temperature and long term mean monthly max temperature Garden Island HSF (station 009256) (BoM, 2021)



7 Monitoring Data Summary

The quarterly monitoring results are presented within Cardno Factual Reports provided in Appendix C. A summary is presented in the following sections.

Physicochemical parameters recorded at each monitoring location during each quarterly monitoring event are provided within the field records tables (6-9) in Appendix D. Summary tables of laboratory analytical results are provided in Tables 1-4, Appendix D.

Sum of PFOS and PFHxS concentration maps for groundwater, porewater and surface water are presented in Appendix A:

- Figures 8A-C for the December 2020 quarterly event;
- Figures 9A-C for the March 2021 quarterly event;
- Figures 10A-C for the June 2021 quarterly event; and
- Figures 11A-C for the September 2021 quarterly event.

7.1 Groundwater

7.1.1 Groundwater geochemical parameters

Groundwater geochemical parameters recorded during the four quarterly monitoring events are summarised in Table 7-1 and provided within Table 6, Appendix D.

Table 7-1 Groundwater Geochemical Parameters

Parameter	December 2020	March 2021	June 2021	Sep 2021
DO	0.29 mg/L (MW125) – 5.24 mg/L (MW257) *Anaerobic to Aerobic conditions*	0.32 mg/L (MW109) – 11.4 mg/L (MW139) *Anaerobic to Aerobic conditions*	0.23 mg/L (MW193) – 6.87 mg/L (MW217) *Anaerobic to Aerobic conditions*	0.5 mg/L (MW125) – 6.51 mg/L (MW257) *Anaerobic to Aerobic conditions*
EC	296.8 µS/cm (MW233) – 55,331 µS/cm (MW149)	534 µS/cm (MW112) – 58,883 µS/cm (MW272)	312.4 µS/cm (MW242) – 51,860 µS/cm (MW137)	328.8 µS/cm (MW257) – 51,642 µS/cm (MW149)
TDS	302.25 mg/L (MW233) – 370,456 mg/L (MW126) *Fresh to highly saline water*	344.5 mg/L (MW112) – 155,050 mg/L (MW109) *Fresh to highly saline water*	203.1 mg/L (MW242)– 33,710 mg/L (MW137) *Fresh to highly saline water*	231.85 mg/L (MW257)– 33,553 mg/L (MW149) *Fresh to highly saline water*
pH	6.96 (MW282) – 8.28 (MW233) *Near neutral to alkaline conditions*	7.09 (MW226) – 8.51 (MW233) *Near neutral to alkaline conditions*	7.02 (MW256) – 8.44 (MW171) *Near neutral to alkaline conditions.*	6.94 (MW126) – 8.39 (MW233) *Near neutral to alkaline conditions*
ORP	-219.2 mV (MW171) – 105 mV (MW268) *Reducing to oxidising groundwater conditions.*	-11,952 mV (MW228) – 118.1 mV (MW216) *Reducing to oxidising groundwater conditions.*	-282.7 mV (MW173) – 527 mV (MW139) *Reducing to oxidising groundwater conditions.*	-11,105 mV (MW224) – 205.7 mV (MW289) *Reducing to oxidising groundwater conditions.*

No seasonal trend was observed in the groundwater geochemical parameters. Groundwater salinity increases with proximity to the coastline.

7.1.2 Groundwater elevations and migration contours

Groundwater levels and flow directions recorded during the quarterly monitoring events (December, March, July, September) are summarised in Table 7-2 and gauging data is provided within Table 5, Appendix D. The inferred groundwater contours for each monitoring event are presented on Figures 4 to 7, Appendix A.

Table 7-2 Groundwater Levels and Flow Direction

Item	December 2020	March 2021	June 2021	Sep 2021
Depths to groundwater	1.615 mbTOC (MW127) – 28.55 mbTOC (MW171)	1.415 mbTOC (MW226) – 28.55 mbTOC (MW171)	1.1 mbTOC (MW226) – 28.392 mbTOC (MW171)	1.59 mbTOC (MW127) – 28.6 (MW171)
Groundwater elevation	0.029 mAHD (MW226) - 1.186 mAHD (MW268)	-0.601 mAHD (MW216) – 0.989 mAHD (MW120)	-1.462 mAHD (MW257) – 1.46 mAHD (MW199)	-0.575 (MW121) – 1.625* (MW517)
Inferred direction of groundwater flow	Groundwater was interpreted to be radial from Garden Island where mounding is occurring with rainfall infiltration. Groundwater flows toward Cockburn Sound of the East and towards the Indian Ocean on the West of the island			
Seasonal difference in groundwater elevation	Groundwater levels were generally consistent between monitoring events, with average SWL readings of 0.369 mAHD in December 2020 and March 2021, and 0.372 mAHD in June 2021 and September 2021.			
Note: The maximum groundwater elevation, 2.625 mAHD reported at MW161 is considered to be a potential error of measurement in the field as this well would be 2m shallower than previous monitoring events and similar fluctuations were not observed at nearby bores. The next greatest SWL value, recorded at MW517 has been reported at the maximum elevation.				

Groundwater elevations and flow direction for the monitoring period were consistent with historical data. Groundwater levels in wells close to the shoreline are expected to be influenced by tidal effects.

7.1.3 Groundwater results summary

A number of monitoring locations are targeting the source areas and down-gradient areas as shown on Figures 3A to 3F, Appendix A.

7.1.3.2 Fire training area

A summary of the PFOA and Sum of PFOS and PFHxS[3] concentrations for the monitoring period and the historical concentration ranges for the FTA monitoring locations is presented in Table 7-3 and plotted on Figure 7-2.

- One new exceedance of the HEPA (2020) drinking water guideline for PFOA (0.56 µg/L) was reported at MW120 in Q3 2021. Other monitoring locations at the FTA exceeding the drinking water criteria for PFOA were MW109 (June 2021), MW112, MW117, MW121 (March and September 2021).
- New exceedances of the HEPA (2020) drinking water criteria for the Sum of PFOS and PFHxS (0.07 µg/L) were reported at MW124 and MW126 (down gradient of the FTA along the coastline) in June 2021. Exceedances of the drinking water guideline for Sum of PFOS and PFHxS have been consistently reported for MW109, MW112, MW117, MW120, MW121 and MW123 also targeting the FTA and at the FTA down-gradient wells MW125 for most monitoring events.
- Exceedances of the recreational use criteria for the Sum of PFOS and PFHxS (2.0 µg/L) were consistently reported for the wells targeting the source area (MW109, MW112, MW117, MW120 and MW121).
- No first-time detection of PFOA or Sum of PFOS and PFHxS were recorded at the FTA during the monitoring period.

Table 7-3 FTA PFOS+PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21
MW109	PFOS+PFHxS	8.8 – 21.3	18.3	7.36	53.2	4.87
	PFOA	0.32 – 0.75	0.48	0.18	0.94	0.16

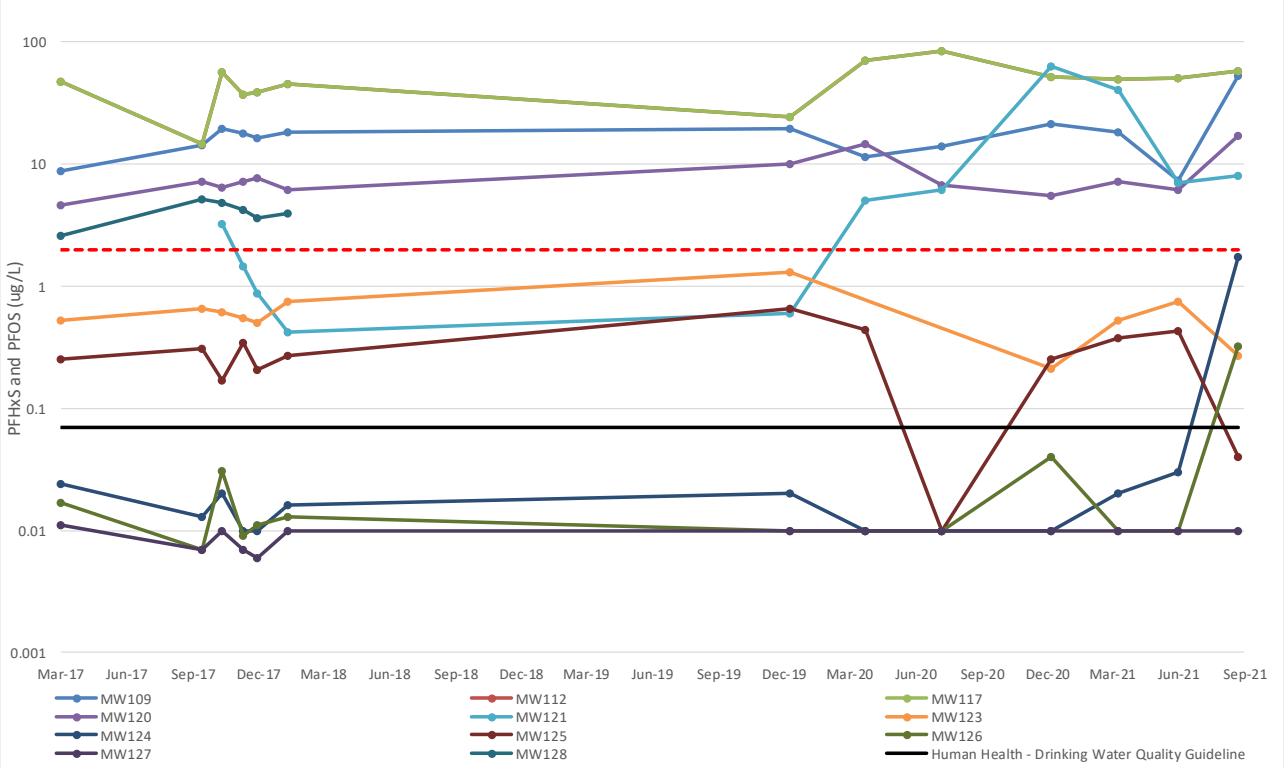
[3] It is noted that PFHxS concentrations were not analysed prior to 2017 and the Sum of PFOS and PFHxS was not reported by the laboratory before 2019. The Sum of PFOS and PFHxS was calculated from PFOS and PFHxS concentrations for the 2017-2018 data.

Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21
MW112	PFOS+PFHxS	14.6 – 83.9	49.1	51	57.2	39.3
	PFOA	0.56 - 7.3	3.84	4.28	3.76	0.94
MW117	PFOS+PFHxS	26.6 – 74.6	42	38	65.9	49.8
	PFOA	0.47 – 2.7	0.7	1.11	1.02	1.12
MW120	PFOS+PFHxS	4.6 – 14.6	5.52	7.14	6.13	17
	PFOA	0.14 - 0.37	0.12	0.2	0.13	1.59
MW121	PFOS+PFHxS	0.42 – 62.8	8.12	47	13.4	87.9
	PFOA	0.029 - 0.88	0.15	1.18	0.28	1.42
MW123	PFOS+PFHxS	0.5 – 1.31	0.21	0.53	0.75	0.27
	PFOA	0.005 - 0.02	<0.01	<0.01	<0.01	<0.01
MW124	PFOS+PFHxS	<0.01 - 0.024	<0.01	<0.01	1.74	<0.01
	PFOA	<0.01 - 0.004	<0.01	<0.01	0.05	<0.01
MW125	PFOS+PFHxS	0.01 - 0.66	0.38	0.43	0.04	0.28
	PFOA	<0.001 - 0.002	<0.01	<0.01	<0.01	<0.01
MW126	PFOS+PFHxS	0.007 - 0.04	<0.01	<0.01	0.32	<0.01
	PFOA	<0.001 - <0.001	<0.01	<0.01	<0.01	<0.01
MW127	PFOS+PFHxS	0.006 - 0.011	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.001	<0.01	<0.01	<0.01	<0.01
MW128	PFOS+PFHxS	2.62 - 5.1	NS	NS	NS	NS
	PFOA	0.029 - 0.14	NS	NS	NS	NS

New Maximum **New Minimum** **New Exceedance**

Note: NS- Not Sampled

Figure 7-2 FTA Sum of PFOS+PFHxS concentration trends (µg/L)



Note: A logarithmic scale was used for the vertical axis

7.1.3.3 Demolition ground

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the demolition ground monitoring locations is presented in Table 7-4 and plotted on Figure 7-3.

- One new exceedance of the drinking water guideline for PFOA (0.56 µg/L) was recorded for MW272 (1.77 µg/L) during the August/September 2021 sampling event. MW272 was located between the source area and the shoreline, and should be reinstated to confirm the above mentioned result. The drinking water guideline for PFOA has been consistently exceeded at MW141.
- One new exceedance of the recreational water guideline (2.0 µg/L) for Sum of PFOS and PFHxS was recorded for MW272 (85.5 µg/L) during the August/September 2021 sampling event. This location has previously exceeded the drinking water criteria (0.7 µg/L) in January 2020 (0.10 µg/L).
- The highest concentration recorded was in MW141 (116 µg/L) for Sum of PFOS and PFHxS during the August/September 2021 sampling event. MW141 is located between the source area and the shoreline. MW142 is located directly downgradient of MW141 and consistently reports exceedances of the Recreational use criteria for the Sum of PFOS and PFHxS.
- No first-time detection of PFOA or Sum of PFOS and PFHxS were recorded at the Demolition Ground during the monitoring period.

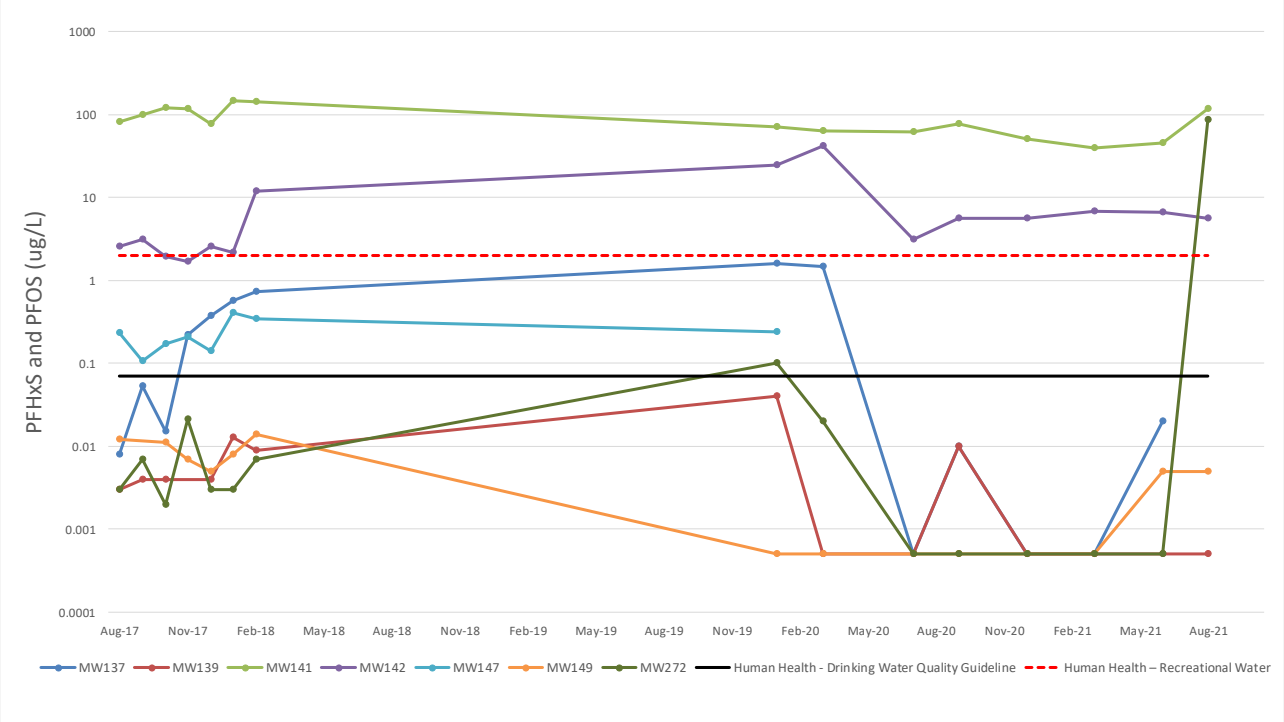
Table 7-4 Demolition ground PFOS+PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21
MW137	PFOS+PFHxS	0.008 – 1.61	<0.01	<0.01	0.02	NS
	PFOA	<0.01 – 0.08	<0.01	<0.01	<0.01	NS
MW139	PFOS+PFHxS	<0.001 – 0.04	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.01 – 0.16	<0.01	<0.01	<0.01	<0.01
	PFOS+PFHxS	62.4 – 147	50.1	39.1	45.7	116

Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21
MW141	PFOA	0.66 – 6.2	1.1	0.78	0.91	2.47
MW142	PFOS+PFHxS	1.7 – 41.8	5.61	6.83	6.71	5.66
	PFOA	0.02 – 3.04	0.24	0.22	0.3	0.24
MW147	PFOS+PFHxS	0.107 – 0.349	NS	NS	NS	NS
	PFOA	<0.001 - 0.13	NS	NS	NS	NS
MW149	PFOS+PFHxS	<0.01 – 0.014	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - 0.001	<0.01	<0.01	<0.01	<0.01
MW272	PFOS+PFHxS	<0.01 - 0.1	<0.01	<0.01	<0.01	85.5
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	1.77
New Maximum		**New Minimum**			**New Exceedance**	

Notes:
NS - Not Sampled

Figure 7-3 Demolition ground PFOS+PFHxS concentrations (µg/L)



Note: A logarithmic scale was used for the vertical axis

7.1.3.4 Waste Water Treatment Plant

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the WWTP monitoring locations is presented in Table 7-5 and plotted on Figure 7-4.

> Exceedances of the HEPA (2020) recreational use criteria were reported during all events for MW161 and MW166 targeting the seepage ponds and MW193 adjacent to the WWTP ponds. The highest concentration recorded was in MW193 (13.4 µg/L) for Sum of PFOS and PFHxS during the June 2020 sampling event.

> No new exceedances or first-time detections were recorded during the 2021 monitoring period.

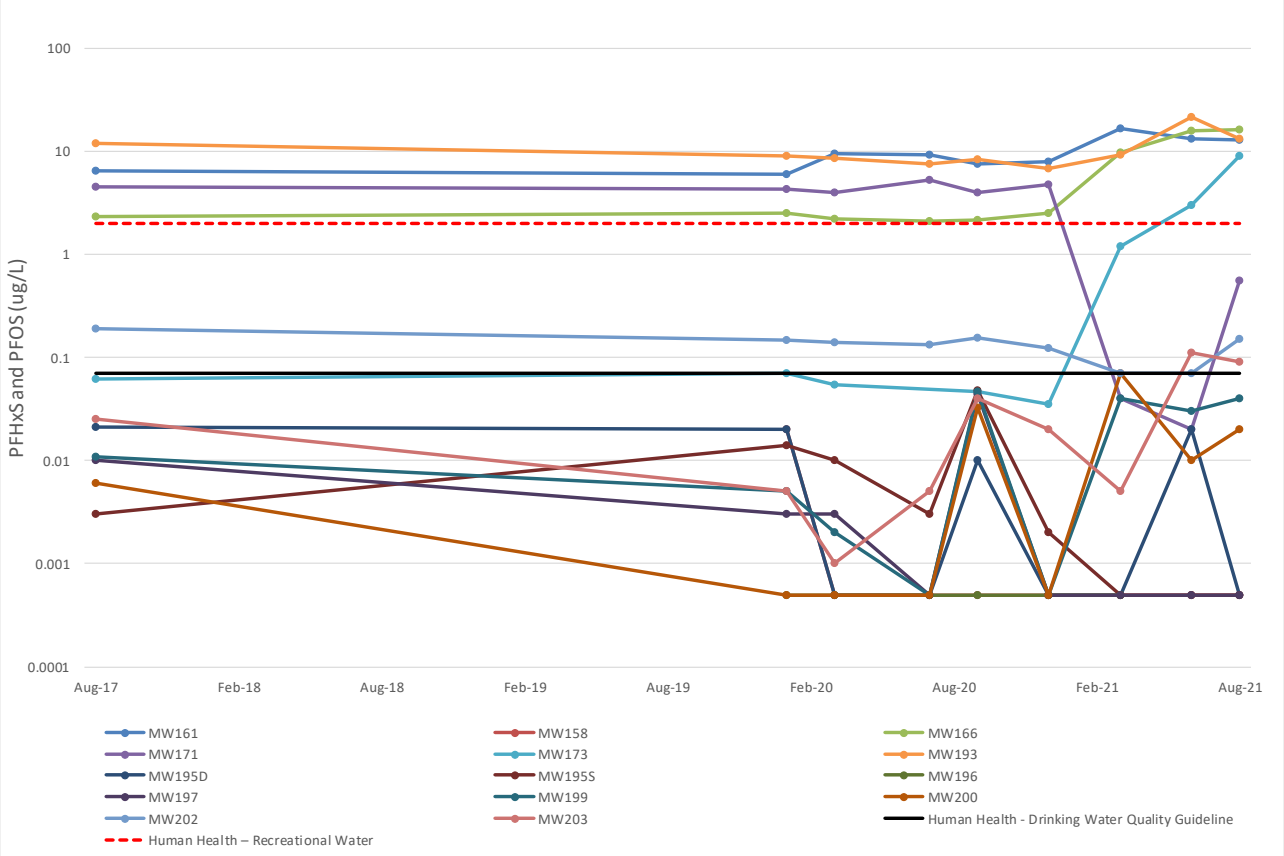
Table 7-5 WWTP PFOS+PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21
MW158	PFOS+PFHxS	<0.01 – 0.02	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
MW161	PFOS+PFHxS	6.0 – 16.8	8.21	7.97	6.8	5.59
	PFOA	0.03 – 0.23	0.11	0.08	0.09	0.08
MW166	PFOS+PFHxS	2.11 – 16	8	NS	10.8	9.11
	PFOA	0.056 – 0.16	0.04	NS	0.16	0.09
MW171	PFOS+PFHxS	0.02 – 5.28	0.08	0.18	<0.01	0.35
	PFOA	<0.01 – 0.26	<0.01	<0.01	<0.01	<0.01
MW172	PFOS+PFHxS	NA	NS	NS	NS	NS
	PFOA	<0.001*	NS	NS	NS	NS
MW173	PFOS+PFHxS	0.035 – 8.91	NS	7.99	13	NS
	PFOA	0.008 – 0.62	NS	0.63	1.1	NS
MW193	PFOS+PFHxS	6.8 – 21.7	8.43	12.1	10.1	13.4
	PFOA	0.3 – 0.81	0.33	0.62	0.49	0.6
MW195D	PFOS+PFHxS	<0.01 - 0.021	<0.01	<0.01	0.02	<0.01
	PFOA	<0.01 - 0.006	<0.01	<0.01	<0.01	<0.01
MW195S	PFOS+PFHxS	0.002 – 0.048	<0.01	<0.01	0.01	<0.01
	PFOA	<0.001 – 0.002	<0.01	<0.01	0.01	<0.01
MW196	PFOS+PFHxS	<0.01	<0.01	NS	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	NS	<0.01	<0.01
MW197	PFOS+PFHxS	<0.001 – 0.044	NS	<0.01	<0.01	<0.01
	PFOA	<0.001 – 0.004	NS	<0.01	<0.01	<0.01
MW199	PFOS+PFHxS	<0.001 – 0.047	<0.01	NS	NS	<0.01
	PFOA	<0.001 – 0.002	<0.01	NS	NS	<0.01
MW200	PFOS+PFHxS	<0.001 - 0.07	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01	<0.01	<0.01
MW202	PFOS+PFHxS	0.07 – 0.19	0.06	0.09	0.07	0.08
	PFOA	<0.001 – 0.002	<0.01	<0.01	<0.01	<0.01
MW203	PFOS+PFHxS	<0.01 - 0.04	0.02	<0.01	0.11	0.09
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01

New Maximum **New Minimum** **New Exceedance**

Notes:
NA – Not Analysed
NS – Not Sampled
* Well only sampled once before

Figure 7-4 WWTP PFOS+PFHxS concentrations (µg/L)



Note: A logarithmic scale was used for the vertical axis

7.1.3.5 Helicopter Support Facility

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the HSF monitoring locations is presented in Table 7-6 and plotted on Figure 7-5.

- Groundwater monitoring at the HSF was somewhat limited due to a number of wells constantly or occasionally found dry (including MW214, MW215, MW220, MW225).
- The highest concentrations were recorded at MW282 (source area) whilst concentrations in MW226 and MW227 (shoreline to the NE) were constantly below the laboratory LOR.
- Exceedances of the HEPA (2020) recreational water guideline for Sum of PFOS and PFHxS (2 µg/L) use criteria were reported during all events for MW216 (source area) and MW282 (source area).
- One new exceedance of the drinking water guideline for PFOA (0.56 µg/L) was reported at MW220 (0.6 µg/L) during the June 2021 sampling event. MW220 is located in the source area. Exceedances of HEPA (2020) drinking water for PFOA (0.56 µg/L) use criteria were reported during all events for MW282 (source area).
- One new exceedance of the drinking water guideline for Sum of PFOS and PFHxS (0.07 µg/L) at MW228 in December 2020 and MW215 in September 2021.
- One first-time detection of PFOA was recorded at MW228 in September 2021.

Table 7-6 HSF PFOS+PFHxS and PFOA concentrations (µg/L)

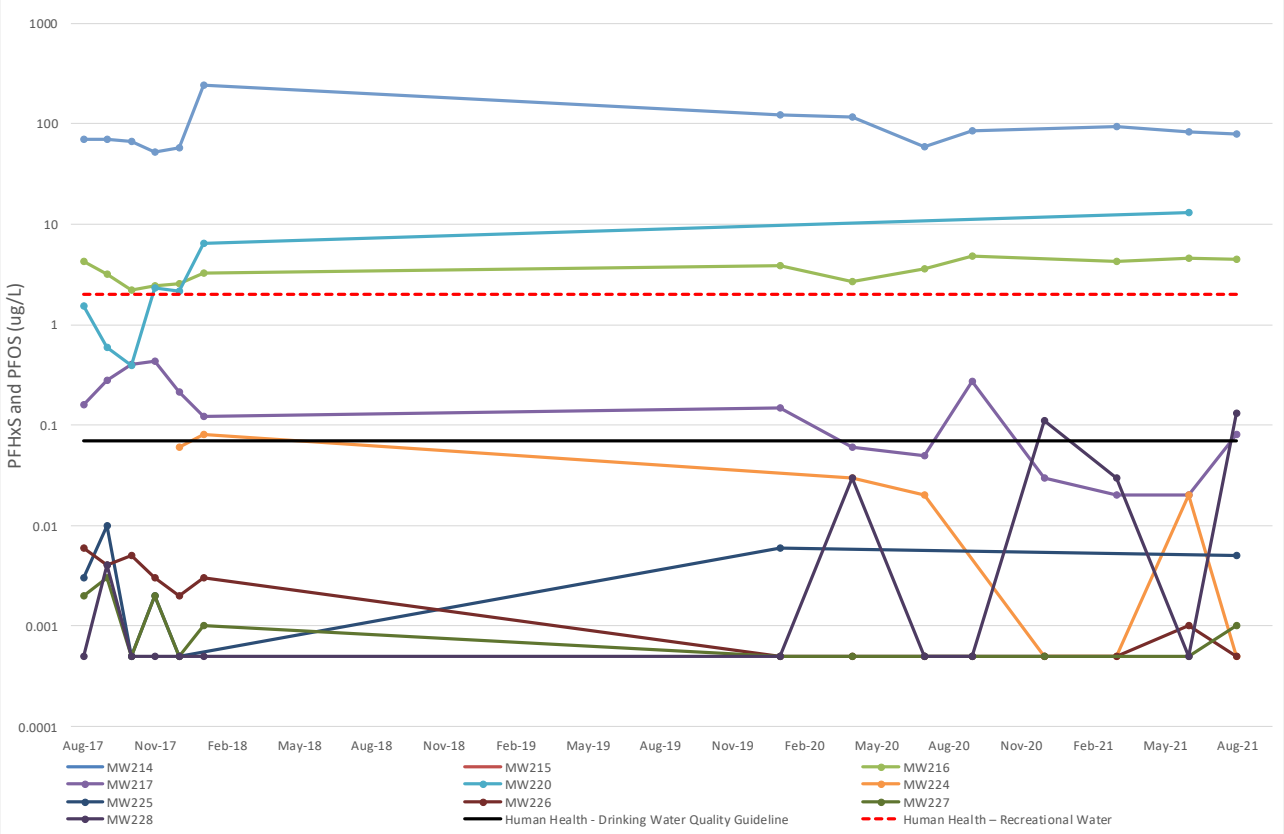
Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21
MW214	PFOS+PFHxS	<0.001*	NS	NS	NS	<0.01
	PFOA	<0.001	NS	NS	NS	<0.01

Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21
MW215	PFOS+PFHxS	0.003*	NS	NS	NS	0.35
	PFOA	<0.001	NS	NS	NS	<0.01
MW216	PFOS+PFHxS	2.228 – 4.258	4.85	4.3	4.57	4.49
	PFOA	0.072 - 0.24	0.26	0.3	0.39	0.3
MW217	PFOS+PFHxS	0.05 – 0.43	0.03	0.02	0.02	0.08
	PFOA	0.2 – 0.33	0.23	0.3	0.38	0.38
MW220	PFOS+PFHxS	0.39 – 6.4	NS	NS	13	NS
	PFOA	0.014 – 0.27	NS	NS	0.6	NS
MW224	PFOS+PFHxS	0.02 – 0.08	<0.01	<0.01	0.02	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
MW225	PFOS+PFHxS	<0.001 – 0.006	NS	NS	NS	<0.01
	PFOA	<0.001 - <0.001	NS	NS	NS	<0.01
MW226	PFOS+PFHxS	<0.01 – 0.006	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01	<0.01	<0.01
MW227	PFOS+PFHxS	<0.001 – 0.003	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.001	<0.01	<0.01	<0.01	<0.01
MW228	PFOS+PFHxS	<0.001 – 0.03	0.11	0.03	<0.01	0.13
	PFOA	<0.001 - <0.001	<0.01	<0.01	<0.01	0.03
MW282	PFOS+PFHxS	58.6 - 243	85.3	94	83	79.1
	PFOA	6.69 – 13	5.77	7.28	4.5	9.37

New Maximum **New Minimum** **New Exceedance**

Notes:
NS - Not sampled
* Only sampled in August 2017

Figure 7-5 HSF PFOS+PFHxS concentrations (µg/L)



Note: A logarithmic scale was used for the vertical axis

7.1.3.6 *AVCAT storage, fuel farm and infiltration swale*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the AVCAT storage, fuel farm and infiltration swale monitoring locations is presented in Table 7-7 and plotted on Figure 7-6.

> No new exceedances or first-time detections were reported for PFOS+PFHxS or PFOA. A new maximum concentration of PFOA was reported at MW236 (fuel farm source area) in September 2021.

> Within the wells targeting the AVCAT area, MW516 recorded the highest concentrations. MW248, downgradient recorded three exceedances of the HEPA (2020) drinking water use criteria.

Table 7-7 AVCAT storage, fuel farm and infiltration swale PFOS+PFHxS and PFOA concentrations (µg/L)

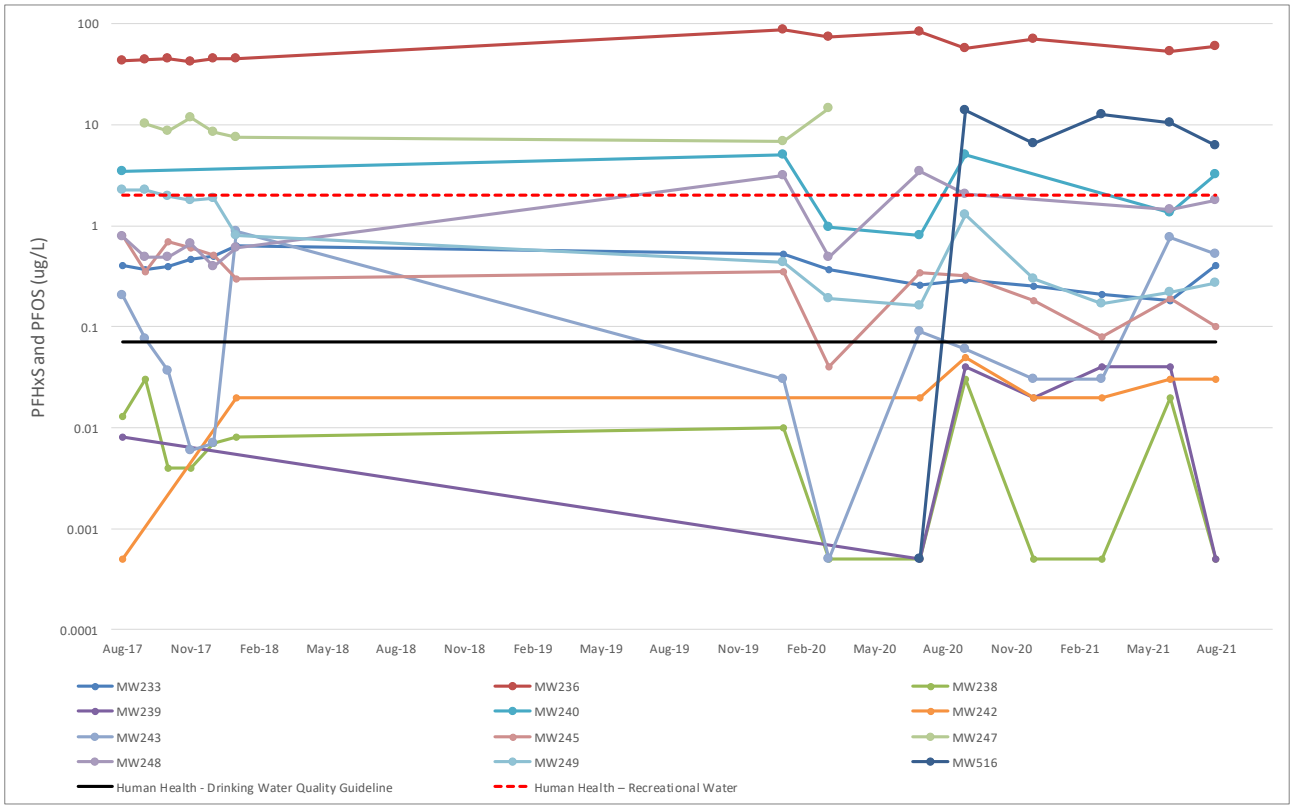
Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21
Infiltration Swale						
MW233	PFOS+PFHxS	0.26 – 0.64	0.25	0.21	0.18	0.41
	PFOA	0.005 – 0.04	<0.01	<0.01	<0.01	<0.01
Fuel Farm						
MW236	PFOS+PFHxS	42 – 87.5	57.5	71.2	53.5	60.8
	PFOA	0.99 – 1.73	1.06	1.24	1.27	1.74
AVCAT Storage						
MW238	PFOS+PFHxS	0.004 – 0.03	<0.01	<0.01	0.02	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
MW239	PFOS+PFHxS	<0.001 – 0.04	0.02	0.04	0.04	<0.01

Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21
	PFOA	0.008 – 0.04	<0.01	<0.01	<0.01	<0.01
MW240	PFOS+PFHxS	0.81 – 5.1	1.34	3.26	3.25	4.21
	PFOA	0.04 – 0.22	0.05	0.3	0.16	0.13
MW242	PFOS+PFHxS	<0.001 – 0.05	0.02	0.03	0.03	<0.01
	PFOA	<0.001 – <0.01	<0.01	<0.01	<0.01	<0.01
MW243	PFOS+PFHxS	0.006 – 0.874	0.03	0.03	0.77	0.53
	PFOA	<0.001 – 0.018	<0.01	<0.01	<0.01	<0.01
MW245	PFOS+PFHxS	0.298 – 0.81	0.18	0.08	0.19	0.1
	PFOA	<0.01 – 0.022	<0.01	<0.01	<0.01	<0.01
MW247/516	PFOS+PFHxS	<0.01 – 14.5	6.53	12.6	10.6	6.22
	PFOA	<0.005 – 0.2	0.09	0.15	0.1	0.06
MW248	PFOS+PFHxS	0.396 – 3.47	1.46	1.78	2.14	NS
	PFOA	0.017 – 0.2	0.06	0.1	0.13	NS
MW249	PFOS+PFHxS	0.16 – 2.27	0.3	0.17	0.22	0.27
	PFOA	<0.01 – 0.083	<0.01	<0.01	<0.01	<0.01

New Maximum | **New Minimum** | **New Exceedance**

Note: NS- Not sampled

Figure 7-6 AVCAT storage, fuel farm and infiltration swale PFOS+PFHxS concentrations (µg/L)



Note: A logarithmic scale was used for the vertical axis

7.1.3.7 *Fire station, Dredge spoil, ship sullage area*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the fire station monitoring locations is presented in Table 7-8 and plotted on Figure 7-7 and Figure 7-8.

- No new exceedances or first-time detections were reported for PFOS+PFHxS or PFOA. New maximum PFOS+PFHxS and PFOA concentrations were reported at MW256 in June 2021, however, concentrations decreased to the historical concentration range in Q3 2021. MW257 also reported new maximum concentrations for both PFOS+PFHxS and PFOA in September 2021.
- Exceedance of the HEPA (2020) drinking water guideline value for PFOA was recorded in MW256 (2.34 µg/L) during the June sampling event (this location consistently exceeds the recreational use criteria for the Sum of PFOS and PFHxS).

Table 7-8 Fire station, dredge soil and ship sullage area PFOS+PFHxS and PFOA concentrations (µg/L)

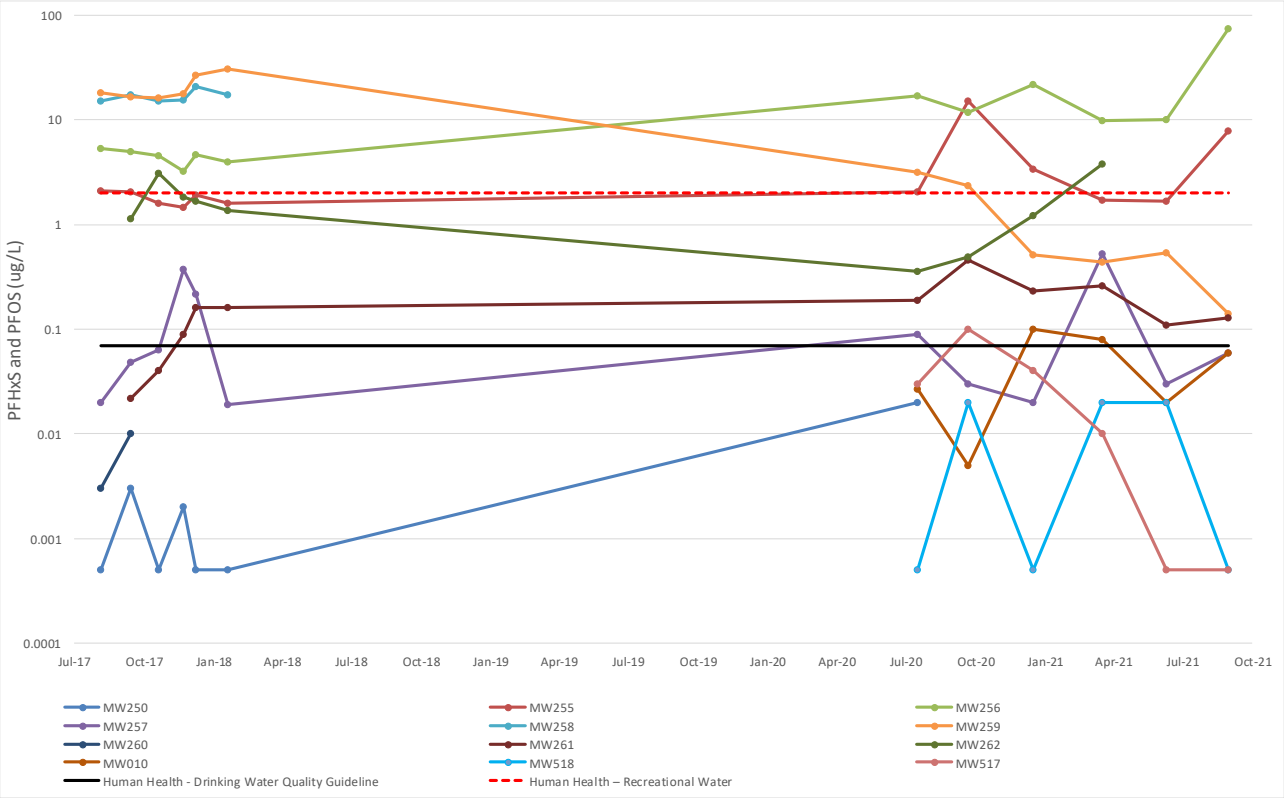
Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21
Fire Station						
MW517	PFOS+PFHxS	0.02 – 0.10	0.04	0.01	<0.01	<0.01
	PFOA	<0.01 - <0.01	<0.01	<0.01	<0.01	<0.01
MW255	PFOS+PFHxS	1.46 – 15.3	3.38	1.7	1.68	7.79
	PFOA	0.03 – 0.06	0.02	0.02	0.01	0.03
MW256	PFOS+PFHxS	3.98 – 22	9.80	10.2	75	18.4
	PFOA	0.093 – 0.67	0.29	0.29	2.34	0.45
Flammable / hazardous goods and waste storage area						
MW257	PFOS+PFHxS	0.019 – 0.53	0.03	0.06	0.11	0.98
	PFOA	<0.001 – 0.07	<0.01	<0.01	0.02	0.12
MW258	PFOS+PFHxS	15.2 – 21	NS	NS	NS	NS
	PFOA	0.42 – 0.53	NS	NS	NS	NS
MW259	PFOS+PFHxS	2.36 – 30.9	0.51	0.44	0.54	0.14
	PFOA	0.02 – 0.56	<0.01	<0.01	<0.01	<0.01
Ship sullage area						
MW260/518	PFOS+PFHxS	0.003 – 0.02	<0.01	0.02	0.02	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
MW261	PFOS+PFHxS	<0.001 – 0.46	0.23	0.26	0.11	0.13
	PFOA	<0.001 – <0.01	<0.01	<0.01	<0.01	<0.01
MW010	PFOS+PFHxS	<0.02 – 0.027	0.10	0.08	0.02	0.06
	PFOA	<0.001 – 0.09	<0.01	<0.01	<0.01	<0.01
Dredge spoil						
MW264	PFOS+PFHxS	0.7 – 2.55	1.41	1.35	1.25	0.54
	PFOA	0.004 – 0.01	<0.01	<0.01	<0.01	<0.01
MW268	PFOS+PFHxS	0.35 – 0.8	0.2	0.3	0.28	0.41
	PFOA	<0.01 – 0.003	<0.01	<0.01	<0.01	<0.01
MW269	PFOS+PFHxS	0.262 – 1.56	0.65	1.07	1.05	1
	PFOA	0.002 – 0.01	<0.01	0.01	0.01	0.01

New Maximum **New Minimum** **New Exceedance**

Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21

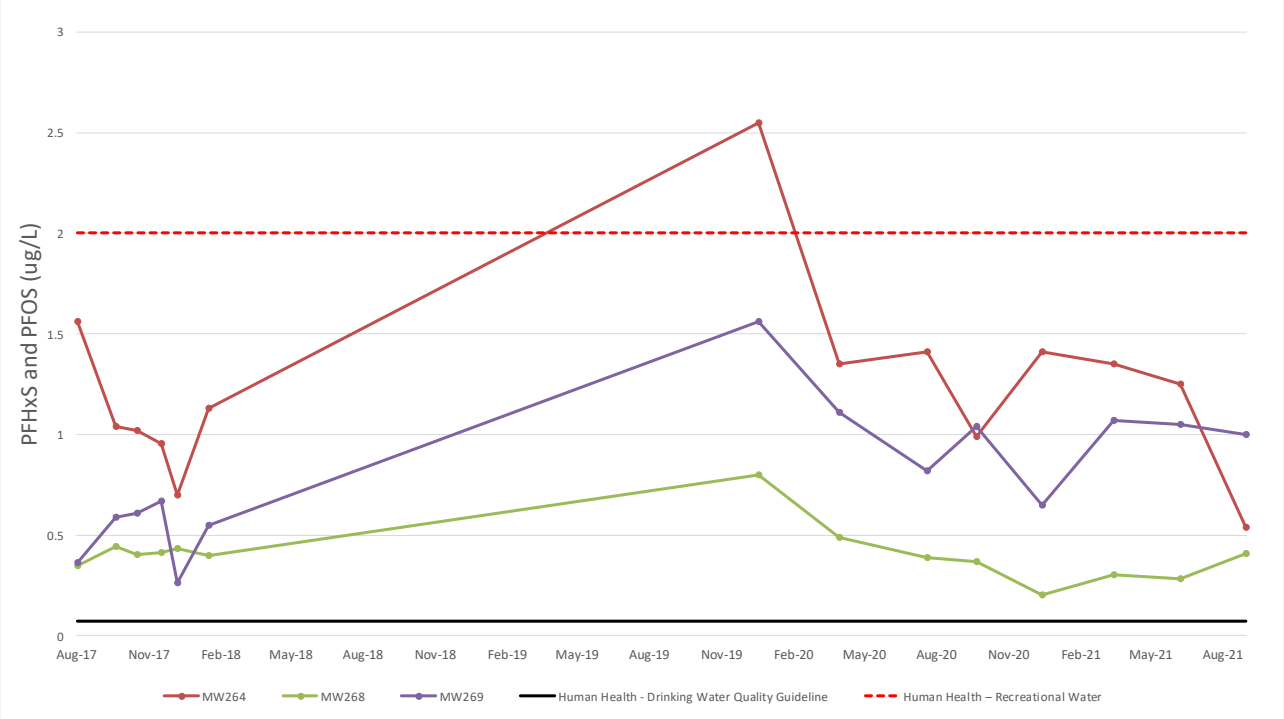
Note: NS- Not sampled

Figure 7-7 Fire station and ship sullage area PFOS+PFHxS concentrations (µg/L)



Note: A logarithmic scale was used for the vertical axis

Figure 7-8 Dredge spoil PFOS+PFHxS concentrations (µg/L)



7.1.3.8 *Accommodation area*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the accommodation area monitoring locations is presented in Table 7-9 and plotted on Figure 7-9.

- No new exceedances, maximum concentrations or first-time detections were reported for PFOS+PFHxS or PFOA.
- The highest concentration recorded was in MW288 (6.59 µg/L) for Sum of PFOS and PFHxS during the March 2021 sampling event. It is noted that this well located close to the shoreline has been dry for two out of four events of the monitoring period.
- Both wells within the accommodation area recorded exceedances of the HEPA (2020) drinking water and recreational use criteria for PFOS+PFHxS. .

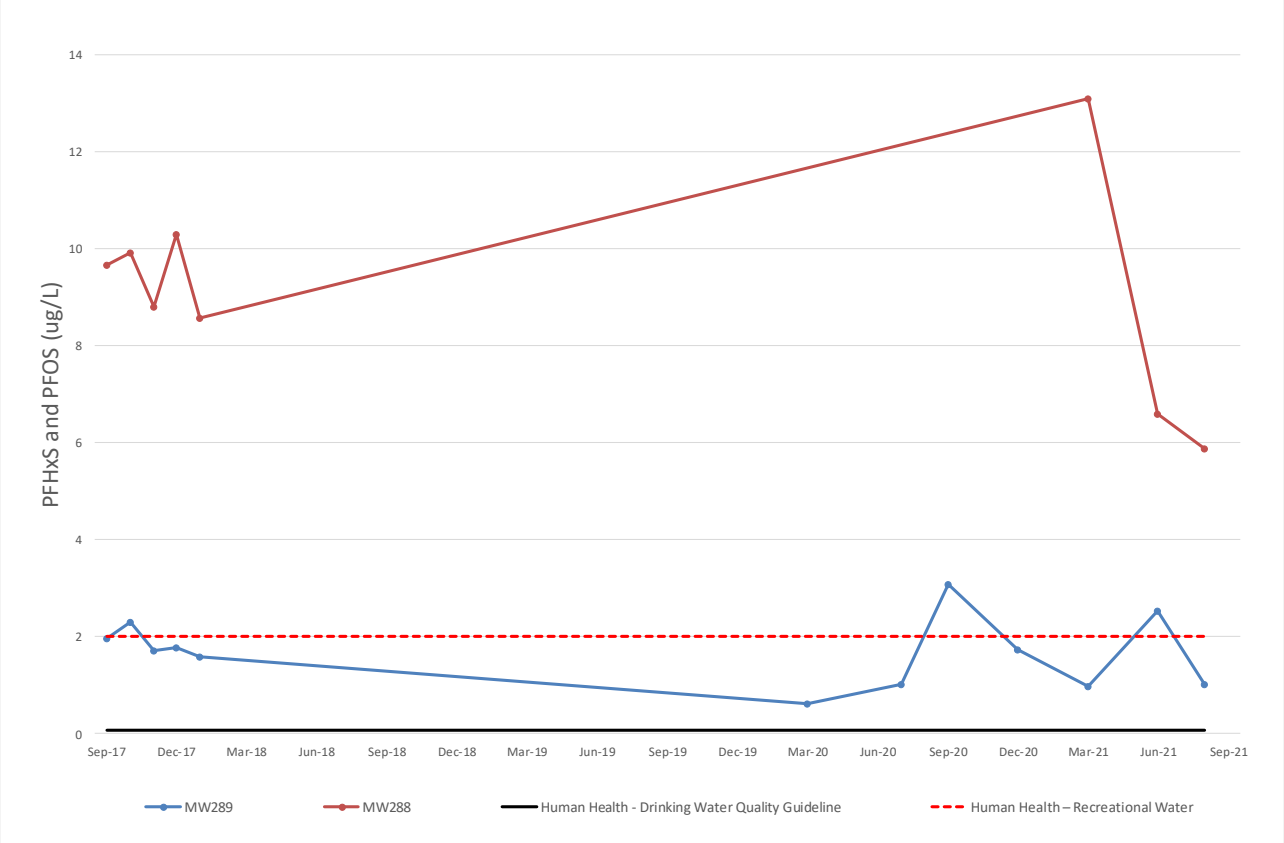
Table 7-9 Accommodation area PFOS+PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min - Max	Dec-20	Mar-21	Jun-21	Sep-21
MW288	PFOS+PFHxS	8.56 – 13.1	NS	6.59	NS	5.87
	PFOA	0.08 – 0.12	NS	0.04	NS	0.03
MW289	PFOS+PFHxS	0.62 – 3.08	1.72	0.97	2.52	1.01
	PFOA	0.006 – 0.04	0.02	<0.01	0.04	<0.01

New Maximum **New Minimum** **New Exceedance**

Note: NS- Not sampled

Figure 7-9 Accommodation area PFOS+PFHxS concentrations (µg/L)



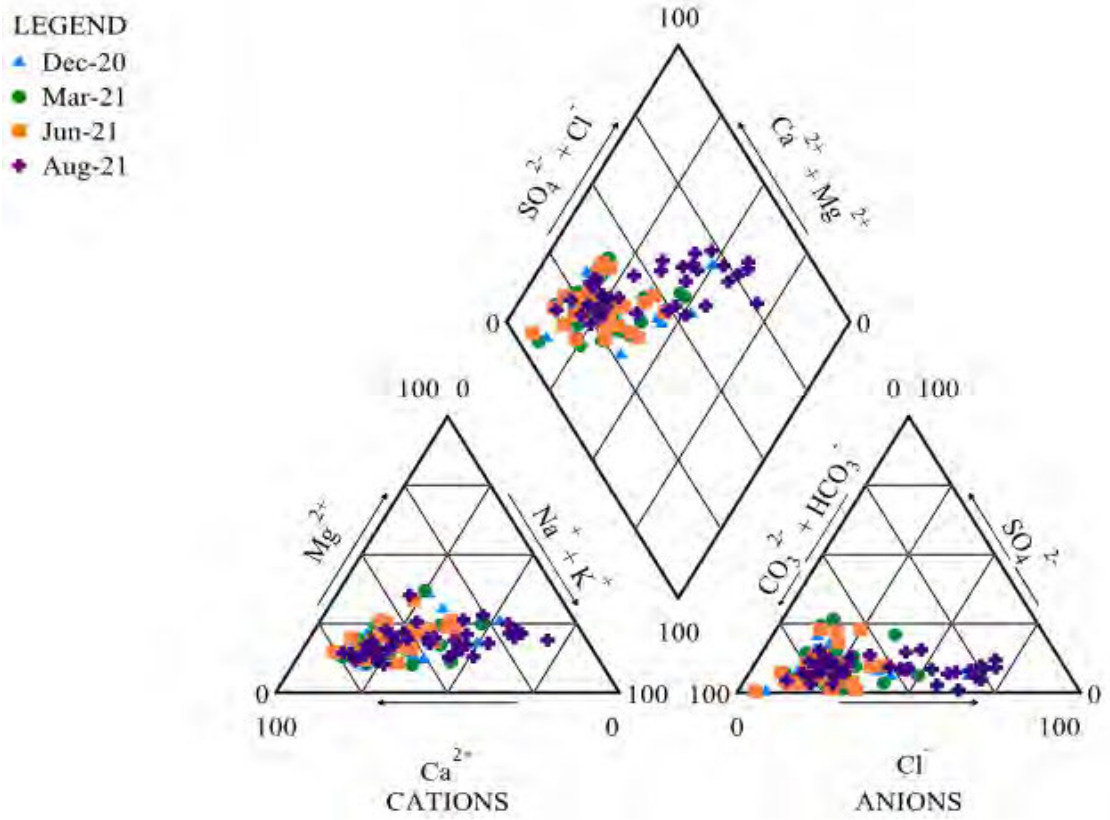
7.1.4 Major Ions Analysis

Major ions analysis was conducted on the groundwater samples collected during each monitoring event to categorise the water type. The results of the groundwater major ion analysis are visually represented in a Piper Diagram shown in Figure 7-10. Two distinct types of water are visible on the diagram:

> Wells closer to the shore are sodium-chloride type due to the influence of saline sea water.

> Inland wells plot in the bicarbonate type.

Figure 7-10 Groundwater Piper Diagram



7.2 Porewater

7.2.1 Porewater geochemical parameters

Porewater geochemical parameters recorded during the four quarterly monitoring events (December, March, June, September) are summarised in Table 7-10 and provided within Table 7, Appendix D.

Table 7-10 Porewater Geochemical Parameters

Parameter	December 2020	March 2021	June 2021	Sep 2021
DO	0.27 mg/L (PW340) – 4.6 mg/L (PW380) *Anaerobic to Aerobic conditions.*	0.26 mg/L (PW367) – 4.61 mg/L (PW407) *Anaerobic to Aerobic conditions.*	0.69 mg/L (PW335) – 6.59 mg/L (PW345) *Aerobic conditions.*	1.16 mg/L (PW407) – 10.97 mg/L (PW315) *Aerobic conditions.*
EC	18,731 µS/cm (PW346) –60,970 µS/cm (PW345)	39,900 µS/cm (pW415) – 62,031 µS/cm (PW340)	14,825 µS/cm (PW405) – 56,302 µS/cm (PW358)	1,765 µS/cm (PW315) – 53,616 µS/cm (PW314)
TDS	5,815 mg/L (PW380) – 55,700 mg/L (PW314) *Saline to Highly saline conditions.*	8,025 mg/L (PW335) – 365,950 mg/L (PW363) *Saline to Highly saline conditions.*	3,553 mg/L (PW413) – 36,597 mg/L (PW358) *Saline to Highly saline conditions.*	1,198 mg/L (PW315) – 34,840 mg/L (PW314) *Saline to Highly saline conditions.*

Parameter	December 2020	March 2021	June 2021	Sep 2021
pH	6.93 (PW345) – 7.93 (PW380) *Near neutral conditions.*	6.96 (PW346) – 8 (PW307) *Near neutral conditions.*	6.68 (PW331) – 8.68 (PW375) *Near neutral to slightly alkaline conditions*	6.82 (PW369) – 8.14 (PW381) *Near neutral conditions*
ORP	-312.9 mV (PW314) – 920 mV (PW363) *Reducing to oxidising conditions.*	-263 mV (PW367) – 132 mV (PW364) *Reducing to oxidising conditions.*	-219.2 mV (PW335) – 155.5 mV (PW330) *Reducing to oxidising conditions.*	-214.3 mV (PW345) – 104.6 mV (PW413) *Reducing to oxidising conditions.*

No seasonal trend was observed in the pore water geochemical parameters. The variability observed in the TDS records is probably related to the tidal movements and influence of seawater ingress.

7.2.2 Porewater results summary

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the porewater monitoring locations are presented in the tables below. It is noted that the results are predominantly below laboratory LOR and therefore the concentration trends have not been plotted.

7.2.2.2 Fire training area

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the FTA monitoring locations is presented in Table 7-11.

- New maximum concentrations of PFOS and PFHxS were reported in all porewater samples in March 2021. New exceedances of the drinking water guideline were reported for PW240 and PW362.
- All pore water locations down gradient of the FTA recorded detectable concentrations of PFOS during the monitoring period, and therefore, exceedances of the HEPA (2020) ecological criteria for 99% species protection (LOR adopted).
- No first-time detections were reported in porewater for PFOS+PFHxS or PFOA at the FTA.

Table 7-11 FTA porewater PFOS+PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
PW335	PFOS and PFHxS	0.004 – 0.02	<0.01	0.07	0.02	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
PW340	PFOS and PFHxS	0.004 – 0.02	0.02	0.28	0.02	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
PW341	PFOS and PFHxS	0.008 – 0.01	0.01	0.04	<0.01	<0.01
	PFOA	<0.001 -<0.01	<0.01	<0.01	<0.01	<0.01
PW362	PFOS and PFHxS	<0.01 - 0.015	<0.01	0.23	0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
PW363	PFOS and PFHxS	0.006 – 0.02	<0.01	0.04	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
PW364	PFOS and PFHxS	<0.01 - 0.023	0.01	0.04	0.02	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01

New Maximum **New Minimum** **New Exceedance**

7.2.2.3 Demolition ground

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the demolition ground monitoring locations is presented in Table 7-12.

> All results at the demolition ground pore water locations were below limit of reporting for both Sum of PFOS and PFHxS and PFOA for the all events of the monitoring period.

Table 7-12 Demolition ground porewater PFOS+PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
PW329	PFOS and PFHxS	<0.01 -0.025	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.01 - 0.003	<0.01	<0.01	<0.01	<0.01
PW330	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
PW331	PFOS and PFHxS	0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 -<0.01	<0.01	<0.01	<0.01	<0.01
PW356	PFOS and PFHxS	0.002 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
PW357	PFOS and PFHxS	0.002 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
PW358	PFOS and PFHxS	0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.01 – 0.001	<0.01	<0.01	<0.01	<0.01
New Maximum		New Minimum		New Exceedance		

7.2.2.4 Waste Water Treatment Plant

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the WWTP monitoring locations is presented in Table 7-13.

> New exceedances of HEPA (2020) drinking water guideline for PFOS and PFHxS (0.07 µg/L) were recorded at PW367 (0.13 µg/L) and PW369 (0.69 µg/L) in December 2020, and PW380 (0.14 µg/L) in September 2021. The highest PFOS and PFHxS concentration recorded was in PW369 (0.69 µg/L) during the December 2020 sampling event, however concentrations during subsequent events were reported at or below the LOR.

> No new exceedances for PFOA were reported, however, a new maximum concentration was recorded at PW369 in December 2020. The concentration decreased to below the LOR in subsequent monitoring events.

> With the exception of PW352, all WWTP pore water monitoring locations recorded detectable concentrations of PFOS during the monitoring period, and therefore exceedances of the HEPA (2020) ecological criteria for 99% species protection (LOR adopted).

> A first-time detection of PFOA, marginally above LOR, was reported at PW369 in December 2020, however all subsequent monitoring results for PFOA were below LOR for this location.

Table 7-13 WWTP porewater PFOS+PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
PW304	PFOS and PFHxS	<0.01 – 0.09	0.02	0.03	<0.01	0.02
	PFOA	<0.01 - 0.003	<0.01	<0.01	<0.01	<0.01
PW345	PFOS and PFHxS	0.02 - 0.144	0.03	0.02	0.02	<0.01
	PFOA	<0.001 -<0.01	<0.01	<0.01	<0.01	<0.01
PW350	PFOS and PFHxS	<0.01 - 4.44	<0.01	0.05	0.01	<0.01
	PFOA	<0.01 - 0.27	<0.01	<0.01	<0.01	<0.01

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
PW351	PFOS and PFHxS	<0.01 - 0.216	<0.01	0.01	0.01	<0.01
	PFOA	<0.001 -<0.01	<0.01	<0.01	<0.01	<0.01
PW352	PFOS and PFHxS	<0.01 - 0.034	<0.01	<0.01	<0.01	0.02
	PFOA	<0.001 -<0.01	<0.01	<0.01	<0.01	<0.01
PW367	PFOS and PFHxS	<0.01 -0.045	0.13	0.01	0.02	<0.01
	PFOA	<0.01 - 0.003	<0.01	<0.01	<0.01	<0.01
PW368	PFOS and PFHxS	<0.01 - 0.054	0.05	0.04	0.01	0.02
	PFOA	<0.01 - 0.009	<0.01	<0.01	<0.01	<0.01
PW369	PFOS and PFHxS	<0.01 – 0.04	0.69	<0.01	0.01	<0.01
	PFOA	<0.001 -<0.01	0.08	<0.01	<0.01	<0.01
PW380	PFOS and PFHxS	<0.01 - 0.868	<0.01	<0.01	<0.01	0.14
	PFOA	<0.01 - 0.001	<0.01	<0.01	<0.01	<0.01
PW381	PFOS and PFHxS	<0.01 - 1.406	<0.01	<0.01	0.01	0.02
	PFOA	<0.01 - 0.004	<0.01	<0.01	<0.01	<0.01
PW401	PFOS and PFHxS	<0.01 - 3.64	<0.01	<0.01	0.03	<0.01
	PFOA	<0.01 - 0.032	<0.01	<0.01	<0.01	<0.01
New Maximum		New Minimum			New Exceedance	

Note: Sept-21 event conducted over Aug21 – Sept21.

7.2.2.4 *Helicopter support facility*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the HSF monitoring locations is presented in Table 7-14.

- One new exceedance of the HEPA (2020) drinking water guideline for PFOS and PFHxS was recorded at PW316 (0.1 µg/L) during the December 2020 sampling event.
- Two first-time detections of Sum of PFOS and PFHxS were reported at PW405 (0.01 µg/L) and PW415 (0.02 µg/L) in December 2020, and at PW409 (0.01 µg/L) in June 2021.

Table 7-14 HSF porewater PFOS+PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
PW306	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
PW307	PFOS and PFHxS	0.001- <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001- <0.01	<0.01	<0.01	<0.01	<0.01
PW308	PFOS and PFHxS	0.002- <0.01	<0.01	0.01	<0.01	<0.01
	PFOA	<0.001- <0.01	<0.01	<0.01	<0.01	<0.01
PW314	PFOS and PFHxS	<0.001- <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001- <0.01	<0.01	<0.01	<0.01	<0.01
PW315	PFOS and PFHxS	0.001- <0.01	<0.01	<0.01	<0.01	0.01
	PFOA	<0.001- <0.01	<0.01	<0.01	<0.01	<0.01
PW316	PFOS and PFHxS	0.001- <0.01	0.1	<0.01	<0.01	<0.01

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
	PFOA	<0.001- <0.01	<0.01	<0.01	<0.01	<0.01
PW405	PFOS and PFHxS	<0.01	0.01	<0.01	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01	<0.01	<0.01
PW407	PFOS and PFHxS	<0.01 - 0.02	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01	<0.01	<0.01
PW409	PFOS and PFHxS	<0.01	<0.01	<0.01	0.01	<0.01
	PFOA	<0.01	<0.01	<0.01	<0.01	<0.01
PW411	PFOS and PFHxS	<0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01	<0.01	<0.01
PW413	PFOS and PFHxS	<0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01	<0.01	<0.01
PW415	PFOS and PFHxS	<0.01	0.02	<0.01	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01	<0.01	<0.01
New Maximum		New Minimum			New Exceedance	

7.2.2.5 *Accommodation area*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the accommodation area monitoring location (PW346) is presented in Table 7-15.

> An exceedance of the HEPA (2020) recreational use criteria for the Sum of PFOS and PFHxS was reported in December 2020. The drinking water criteria was exceeded in March and September 2021.

> There were no guideline exceedances for PFOA.

Table 7-15 Accommodation Area porewater PFOS+PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
PW346	PFOS and PFHxS	0.01 – 5.62	3.16	0.12	0.03	0.39
	PFOA	<0.01 – 0.06	0.03	<0.01	<0.01	<0.01
New Maximum		New Minimum			New Exceedance	

7.2.2.6 *Dredge spoil and careening bay*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the dredge spoil and careening bay monitoring locations is presented in Table 7-16.

> No exceedances, maximum concentrations or first-time detections were recorded during the 2021 sampling events at the dredge spoil and careening bay area.

Table 7-16 Dredge spoil and careening bay porewater PFOS+PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
PW374	PFOS and PFHxS	<0.01 – 0.44	<0.01	0.04	0.08	0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
PW375	PFOS and PFHxS	0.01 – 0.09	0.02	0.03	0.02	0.05

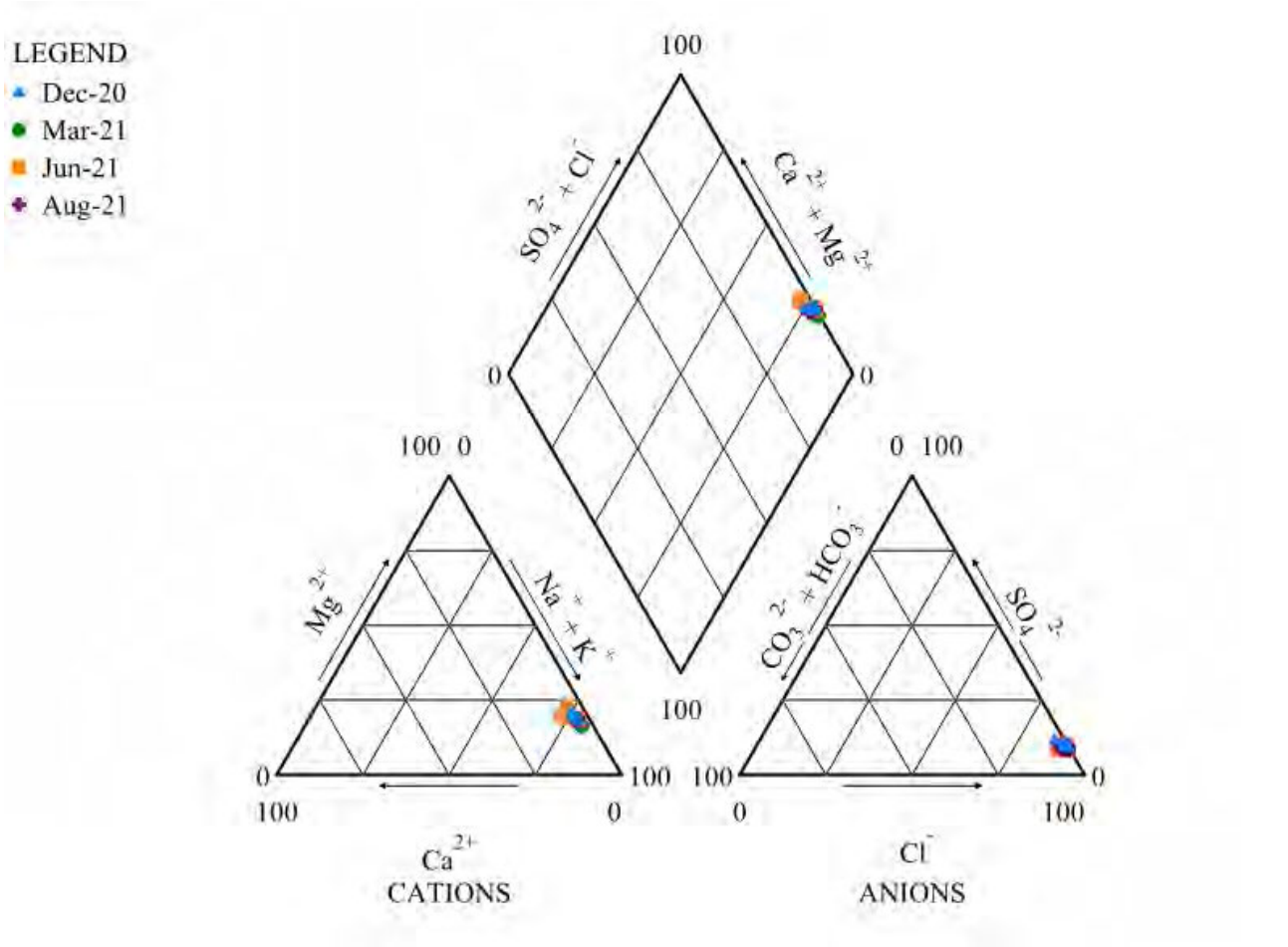
Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
PW378	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.12	0.02	0.02	0.05	0.01
	PFOA	0.005 - <0.01	<0.01	<0.01	<0.01	<0.01
New Maximum		New Minimum			New Exceedance	

7.2.3 Major Ion Analysis

Major ions analysis was conducted on the groundwater samples collected during each monitoring event to categorise the water type. The results of the porewater major ion analysis are visually represented in a Piper Diagram shown in Figure 7-11.

Strong influence of the hyper saline sea water is observed on the porewater's ions composition (sodium-chloride water type).

Figure 7-11 Porewater Piper Diagram



7.3 Surface Water

7.3.1 Surface water geochemical parameters

Surface water geochemical parameters recorded during the four quarterly monitoring events are summarised in Table 7-17 and provided within Table 8, Appendix D.

Table 7-17 Surface water Geochemical Parameters

Parameter	December 2020	March 2021	June 2021	Sep 2021
DO	0.04 mg/L (SW309) – 5.78 mg/L (SW305) *Anaerobic to Aerobic conditions*	2.9 mg/L (SW156) – 10.45 mg/L (SW406) *Aerobic conditions*	1.1 mg/L (SW130) – 6.24 mg/L (SW317) *Aerobic conditions*	4.34 mg/L (SW156) – 7.76 mg/L (SW382) *Aerobic conditions*
EC	52,321 µS/cm (SW130) – 56,798 µS/cm (SW416)	51,889 µS/cm (SW134) – 57,773 µS/cm (SW416)	52,927 µS/cm (SW410) – 54,785 µS/cm (SW150)	27,903 µS/cm (SW408) – 53,300 µS/cm (SW383)
TDS	35,010 mg/L (SW384) – 36,920 mg/L (SW416) *Highly saline water*	35,395 mg/L (SW370)– 37,570 mg/L (SW416) *Highly saline water*	34,400 mg/L (SW410)– 35,611 mg/L (SW150) *Highly saline water*	3.839 mg/L (SW130)– 34,645.5 mg/L (SW383) *Fresh to highly saline water*
pH	7.44 (SW309) – 8.34 (SW371) *Near neutral conditions*	7.73 (SW152) – 8.31 (SW317) *Near neutral conditions*	7.72 (SW373) – 8.92 (SW317) *Near neutral to slightly alkaline conditions*	7.5 (SW410) – 8.2 (SW370) *Near neutral conditions*
ORP	-284.6 mV (SW309) – 135.4 mV (SW152) *Reducing to oxidising conditions.*	0.8 mV (SW410) – 95 mV (SW156) *Oxidising conditions.*	-185.4 mV (SW130) – 133 mV (SW154) *Reducing to oxidising conditions.*	-152.4 mV (SW309) – 166.1 mV (SW410) *Reducing to oxidising conditions.*

7.3.2 Surface water results summary

7.3.2.2 Fire training area

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the FTA monitoring locations is presented in Table 7-18.

> No new exceedances of the HEPA (2020) guidelines or first-time detections were reported during any of the sampling events during 2021.

> New maximum concentrations were reported for PFOS and PFHxS at SW130 in June 2021 and SW134 in March 2021. The subsequent monitoring events reported concentrations below the LOR.

Table 7-18 FTA surface water PFOS and PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SW130	PFOS and PFHxS	<0.01 – 0.03	<0.01	0.02	0.05	<0.01
	PFOA	<0.01	<0.01	<0.01	<0.01	<0.01
SW132	PFOS and PFHxS	<0.01 – 0.07	<0.01	0.03	0.01	<0.01
	PFOA	<0.01	<0.01	<0.01	<0.01	<0.01
SW134	PFOS and PFHxS	<0.01 – 0.01	<0.01	0.03	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01	<0.01	<0.01
New Maximum			**New Minimum**		**New Exceedance**	

7.3.2.3 Demolition ground

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the demolition ground monitoring locations is presented in Table 7-19.

> No detectable concentrations of PFAS were recorded at any of the surface water monitoring locations down-gradient of the demolition ground during the monitoring period.

Table 7-19 Demolition ground surface water PFOS and PFHxS, and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SW150	PFOS and PFHxS	<0.01 - 0.001	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW152	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW154	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW156	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
New Maximum		**New Minimum**			**New Exceedance**	

7.3.2.4 Waste Water Treatment Plant

Surface water locations are monitored on the east and west shores both sides of the WWTP.

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the WWTP monitoring locations is presented in Table 7-20.

- New exceedances of the drinking water guideline for Sum of PFOS and PFHxS were recorded at SW371 and SW305 in December 2020 and SW382 in September 2021. This was also a first-time detection for SW382.
- The highest concentration recorded was in SW305 (0.4 µg/L) for Sum of PFOS and PFHxS during the March 2021 sampling event.

Table 7-20 WWTP surface water PFOS and PFHxS, and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
		West Shore				
SW353	PFOS and PFHxS	<0.001 – 0.52	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 – 0.01	<0.01	<0.01	<0.01	<0.01
SW382	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	0.17
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW383	PFOS and PFHxS	0.001 – 0.02	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW384	PFOS and PFHxS	<0.001 – 0.01	<0.01	<0.01	<0.01	0.02
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
		East shore				
SW370	PFOS and PFHxS	<0.01 – 0.08	0.05	0.01	0.03	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW371	PFOS and PFHxS	<0.01 - 0.012	0.31	0.24	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
		East shore (cross-gradient)				
SW305	PFOS and PFHxS	0.011 – 0.04	0.13	0.4	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SW372	PFOS and PFHxS	0.02 - 0.059	0.04	0.01	<0.01	<0.01
	PFOA	<0.01 - 0.002	<0.01	<0.01	<0.01	<0.01
SW373	PFOS and PFHxS	<0.01 - 0.56	0.05	0.04	0.02	0.4
	PFOA	<0.01 – 0.01	<0.01	<0.01	<0.01	0.01
New Maximum		New Minimum		New Exceedance		

Note: Sept-21 event conducted over Aug21 – Sept21.

7.3.2.5 *Helicopter support facility*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the HSF monitoring locations is presented in Table 7-21.

> Two first-time detections of Sum of PFOS and PFHxS during the March 2021 sampling event recorded at PW406 (0.02 µg/L) and PW414 (0.04 µg/L). The highest concentration recorded was SW414 (0.01 µg/L) for Sum of PFOS and PFHxS during the March 2021 sampling event.

Table 7-21 HSF surface water PFOS and PFHxS, and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SW309	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW310	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW311	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW406	PFOS and PFHxS	<0.001 - <0.01	<0.01	0.02	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW408	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW410	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW412	PFOS and PFHxS	<0.001 – 0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW414	PFOS and PFHxS	<0.001 - <0.01	<0.01	0.04	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW416	PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
New Maximum		New Minimum		New Exceedance		

7.3.2.6 *Dredge spoil and careening bay*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the dredge spoil and careening bay monitoring locations is presented in Table 7-22.

> No detectable concentrations of PFAS were recorded at any of the surface water monitoring locations down-gradient of the dredge spoil and careening bay during the monitoring period.

Table 7-22 Dredge spoil and careening bay surface water PFOS and PFHxS and PFOA concentrations (µg/L)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SW317	PFOS and PFHxS	0.008 – 0.01	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW318	PFOS and PFHxS	<0.01 - 0.001	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
SW319	PFOS and PFHxS	<0.001 – 0.13	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01	<0.01	<0.01
New Maximum		New Minimum		New Exceedance		

7.4 Sediment

7.4.1 Sediment Field Observations

Sediment observations recorded during the four quarterly monitoring events (December, March, June, September) are provided within Table 9, Appendix D.

Sediment samples were generally described as wet grey/white sand.

7.4.2 Sediment results summary

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the sediment sampling locations are presented in the tables below. It is noted that the results are predominantly below laboratory LOR and therefore the results have not been plotted.

7.4.2.2 Fire training area

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the FTA monitoring locations is presented in Table 7-23.

> All results for the monitoring period were below limit of reporting for both Sum of PFOS and PFHxS and PFOA, with exception of SD335 (first-time detection - 0.0005 mg/kg) SD362 (first-time detection - 0.0002 mg/kg) during the March 2021 sampling event.

Table 7-23 FTA sediment PFOS and PFHxS and PFOA concentrations (mg/kg)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SD335	PFOS and PFHxS	<0.0002	<0.0002	0.0005	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD340	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD341	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD362	PFOS and PFHxS	<0.0002	<0.0002	0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD363	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SD364	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

New Maximum | New Minimum | New Exceedance

7.4.2.3 *Demolition ground*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the demolition ground monitoring locations is presented in Table 7-24.

> All results for the monitoring period were below limit of reporting for both Sum of PFOS and PFHxS and PFOA.

Table 7-24 Demolition ground sediment PFOS and PFHxS and PFOA concentrations (mg/kg)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SD329	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD330	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD331	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD356	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD357	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD358	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002

New Maximum | New Minimum | New Exceedance

7.4.2.4 *Waste Water Treatment Plant*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the dredge spoil and careening bay monitoring locations is presented in Table 7-25.

> No new PFAS exceedances were reported in the monitoring period. New maximum concentrations were reported at SD304, SD345, SD350, SD351, SD367, SD368 and SD380.

> A first-time detection of Sum of PFOS and PFHxS was reported at SD351 (0.0003 µg/L) in June 2021.

> The highest concentration recorded SD345 (0.0017 mg/kg) for Sum of PFOS and PFHxS in the March 2021 sampling event.

Table 7-25 WWTP sediment PFOS and PFHxS and PFOA concentrations (mg/kg)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SD304	PFOS and PFHxS	<0.0002 – 0.0004	<0.0002	<0.0002	0.0006	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD345	PFOS and PFHxS	<0.0002 – 0.0002	<0.0002	0.0017	0.0003	<0.0002

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD350	PFOS and PFHxS	<0.0002 – 0.0004	0.0004	0.0005	0.0003	0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD351	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	0.0003	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD352	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD367	PFOS and PFHxS	<0.0002	0.0007	<0.0002	0.0004	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD368	PFOS and PFHxS	<0.0002 – 0.0004	<0.0002	<0.0002	0.001	0.0006
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD369	PFOS and PFHxS	<0.0002 – 0.0006	0.0003	<0.0002	0.0003	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD380	PFOS and PFHxS	<0.0002 – 0.0002	<0.0002	<0.0002	0.0003	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD381	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD401	PFOS and PFHxS	<0.0002 – 0.0004	0.0004	0.0004	0.0003	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
New Maximum		New Minimum			New Exceedance	

7.4.2.5 *Helicopter Support Facility*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the HSF monitoring locations is presented in Table 7-26.

- A first-time detection of Sum of PFOS and PFHxS was reported at SD409 (0.0011 mg/kg) during the June 2021 sampling event.
- All results for the monitoring period were below the limit of reporting for both Sum of PFOS and PFHxS and PFOA, expect for SD405 (0.0003 mg/kg) during the August/September 2021 sampling event and SD409 (0.0011 mg/kg) during the June 2021 sampling event.

Table 7-26 HSF sediment PFOS and PFHxS and PFOA concentrations (mg/kg)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SD306	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD307	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD308	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD314	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SD315	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD316	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD405	PFOS and PFHxS	<0.0002 – 0.0003	<0.0002	<0.0002	<0.0002	0.0003
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD407	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD409	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	0.0011	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD411	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD413	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD415	PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
New Maximum		New Minimum			New Exceedance	

7.4.2.6 *Accommodation area*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the accommodation area monitoring locations is presented in Table 7-27.

> All results for the monitoring period were below limit of reporting PFOA. Sum of PFOS and PFHxS was detected in every monitoring event, however, there were no new maximums or exceedances of the assessment criteria.

Table 7-27 Accommodation area sediment PFOS and PFHxS and PFOA concentrations (mg/kg)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SD346	PFOS and PFHxS	0.0006 – 0.0116	0.0096	0.0008	0.0028	0.0024
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
New Maximum		New Minimum			New Exceedance	

7.4.2.7 *Dredge spoil and careening bay*

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the dredge spoil and careening bay monitoring locations is presented in Table 7-28.

> All results for the monitoring period were below limit of reporting PFOA.

> There were no new exceedances or first-time detections for the Sum of PFOS and PFHxS, however new maximums were reported at SD374 in Q2 2021 and SD378 in Q3 2021. The highest concentration of Sum of PFOS and PFHxS was recorded at SD378 (0.0005 mg/kg).

Table 7-28 Dredge spoil and careening bay sediment PFOS and PFHxS and PFOA concentrations (mg/kg)

Location ID	Analyte	Historical range	OMP Monitoring			
		Min – Max	Dec-20	Mar-21	Jun-21	Sep-21
SD374	PFOS and PFHxS	<0.0002 – 0.0003	<0.0002	<0.0002	0.0004	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD375	PFOS and PFHxS	<0.0002 – 0.0006	<0.0002	0.0002	0.0004	0.0004
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002
SD378	PFOS and PFHxS	<0.0002 – 0.0004	<0.0002	<0.0002	0.0004	0.0005
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002

New Maximum **New Minimum** **New Exceedance**

8 Interpretive Analysis

The following sections present a high-level interpretation for each monitoring area, based on the available data set for each media monitored. The data used for the interpretive analysis include groundwater monitoring data obtained since 2017, pore water and surface water monitoring data recorded between March 2018 and September 2021 and sediment monitoring data between January 2020 and September 2021.

Plume stability (using the Mann-Kendall analysis) has been calculated for each groundwater monitoring well that has sufficient temporal data (i.e. a minimum of four results), with outputs of the statistical analysis presented in Appendix D and summarised in Tables 8-1 to 8-7. Concentrations of the sum of PFOS and PFHxS were used for the plume stability assessment. Statistical trend analysis was not undertaken for the porewater and surface water monitoring results due to the majority of the results being below laboratory LOR.

The outcomes of the Mann-Kendall statistical analysis are to be read in conjunction with the associated confidence factors and the spatial location of the monitoring wells to assess plume stability. The overall plume stability condition can be characterised by looking at concentration trends at individual locations and plume length vs time (GSI, 2012).

Trends in concentrations over time have been assessed using the publicly available GSI Environmental Mann-Kendall toolkit (GSI, 2012). A minimum of four results per monitoring location are required to calculate a trend (i.e. increasing, stable or decreasing). The Mann-Kendall test relies of three statistical metrics (GSI, 2012), as follow:

- The **'S' Statistic** indicates whether concentration trend versus time is generally decreasing (S<0) or increasing (S>0).
- The **Confidence Factor (CF)** value indicates the degree of confidence in the trend result as in "Decreasing" vs. "Probably Decreasing" or "Increasing" vs. "Probably Increasing". A CF between 90% and 95% indicate a "Probably" increasing or decreasing trend, when CF>95% the data demonstrate a strong trend, either "Increasing" or "Decreasing".
- The **Coefficient of Variation** (CoV) is used to distinguish between a 'No Trend' result and a 'Stable' result for dataset with no significant increasing or decreasing trend.

8.1 Fire Training Area

The spatial extent of groundwater, pore water and surface water Sum of PFOS and PFHxS concentrations at the FTA is shown (Appendix A) on Figure 8B (Dec-20), Figure 9B (Mar-21), Figure 10B (Jun-21) and Figure 11B (Sept-21). The sediment results are shown on Figure 12B (Dec-20), Figure 13B (Mar-21), Figure 14B (Jun-21) and Figure 15B (Sept-21).

Groundwater

Groundwater monitoring wells MW109, MW112, MW117, MW120, MW121, MW123 and MW128 are targeting the FTA source area and MW124, MW125, MW126 and MW127 are positioned down-gradient, along the shoreline. It is noted that MW128 has not been sampled (dry) during the monitoring period.

Table 8-1 Mann-Kendall Trend Analysis Summary – Fire Training Area

Location	PFOS Trend	Confidence Factor (%)	PFOA Trend	Confidence Factor (%)	Sum of PFOS & PFHxS Trend	Confidence Factor (%)
MW109	Increasing	99.2	Stable	88.3	No Trend	54.3
MW112	Stable	58.5	No Trend	58.5	No Trend	88.3
MW117	No Trend	54.3	Decreasing	99.3	Stable	58.5
MW120	No Trend	76.4	No trend	66.2	No Trend	81.6
MW121	Increasing	99.0	Increasing	99.8	Increasing	99.9
MW123	Decreasing	99.7	No Trend	77.7	Stable	61.9
MW124	Probably Decreasing	95.0	No Trend	70.5	Probably Decreasing	90.4

Location	PFOS Trend	Confidence Factor (%)	PFOA Trend	Confidence Factor (%)	Sum of PFOS & PFHxS Trend	Confidence Factor (%)
MW125	No Trend	66.6	Probably Decreasing	90.4	No Trend	58.5
MW126	Probably Decreasing	92.9	Stable	47.8	No Trend	82.1
MW127	Decreasing	99.9	Stable	66.6	Decreasing	99.8
MW128*	Stable	39.3	Decreasing	99.9	Stable	64.0

Note: *This well hasn't been sampled during the monitoring period.

The results of the plume stability analysis generally indicate increasing or stable trends at the source area for PFOS and PFOA, with exception of MW123, which reported a decreasing PFOS trend and MW128, which reported a decreasing PFOA trend.

A Sum of PFOS and PFHxS trend could not be established for MW109, MW112 and MW117 due to the variability in the results. MW121 displays an increasing Sum of PFOS and PFHxS trend (confidence factor >90%). All source area wells continually exceeded the HEPA (2020) recreational use criteria for (2 µg/L) Sum of PFOS and PFHxS by approximately one order of magnitude, with the exception of MW123.

The results of the plume stability analysis at the down-gradient wells show stable or decreasing trends when a trend could be established. These wells are anticipated to be influenced by the tides as shown by the TDS and EC readings, and ions concentrations (indicating a more saline water than inlands wells) which could play a role in PFAS dilution. The detected Sum of PFOS and PFHxS concentrations at these wells were one to two orders of magnitude lower than the source area wells. Changes were observed in the coastline monitoring wells MW124 and MW126 with Sum of PFOS and PFHxS concentrations increasing by an order of magnitude or more in June 2021 compared to previous events, with concentrations returning to below LOR in September 2021. It Is likely that these changes are related to the time of sampling (i.e. outgoing or incoming tide).

The following changes in trends from the 2020 AIR were noted with the additional 2021 monitoring data:

- MW117 PFOA trend was probably increasing and is now decreasing.
- MW120 PFOS and Sum of PFOS and PFHxS trends were increasing/probably increasing and no statistically significant trend can be established with the addition of the 2021 data.
- MW121 now displays an increasing PFOS trend (no trend could be established in 2020).
- MW123 displays a decreasing PFOS trend (previously stable) and no PFOA trend (previously probably increasing).
- MW126 displays a probably decreasing PFOS trend (previously stable).

Porewater

Detectable concentrations of the Sum of PFOS and PFHxS (0.01 – 0.28 µg/L) were reported for the FTA porewater locations, including first time exceedances of the drinking water criteria at PW340 and PW362. Those detections indicate PFAS migration with groundwater towards the coastline. However, the relatively low level of detections compared to groundwater concentrations up-gradient indicates dilution in sea water is occurring. This is supported by the geochemical parameters' records showing a salinity increase in porewater when compared to groundwater. No other change in comparison to the 2020 data is noted.

Surface water

Detectable concentrations of the Sum of PFOS and PFHxS were reported for the FTA surface water monitoring locations in March and June 2021 confirming the PFAS plume is migrating towards the ocean which is consistent with the 2020 AIR observations. Detected concentrations were of the same order of magnitude as the LOR and porewater results (with exception of PW340 and PW362, where surface water results were an order of magnitude lower).

Sediment

Detectable concentrations of the Sum of PFOS and PFHxS were reported for the FTA sediment samples SD335 and SD362 in March 2021. The two detections were within the same order of magnitude as the LOR.

The concentrations were not detected above the LOR at these locations for all other monitoring events. The detections in March 2021 are likely related to the high porewater concentrations recorded at the same locations in the same monitoring event. No other change from the 2020 AIR observations is noted.

8.2 Demolition Ground

The spatial extent of groundwater, pore water and surface water Sum of PFOS and PFHxS concentrations at the Demolition Ground is shown (Appendix A) on Figure 8A (Dec-20), Figure 9A (Mar-21), Figure 10A (Jun-21) and Figure 11A (Sept-21). The sediment results are shown on Figure 12A (Dec-20), Figure 13A (Mar-21), Figure 14A (Jun-21) and Figure 15A (Sept-21).

Groundwater

MW139 is targeting the Demolition Ground source area, MW141 and MW147 are located directly down-gradient; and MW137, MW142, MW272 and MW149 are situated along the shoreline. It is noted that MW147 was only sampled in July 2020 during the monitoring period.

Table 8-2 Mann-Kendall Trend Analysis Summary – Demolition Ground

Location	PFOS Trend	Confidence Factor (%)	PFOA Trend	Confidence Factor (%)	Sum of PFOS & PFHxS Trend	Confidence Factor (%)
MW137	No Trend	75.8	No Trend	58.5	No Trend	56.4
MW139	Probably Decreasing	94.9	Stable	48.0	No Trend	68.7
MW141	Stable	70.4	Decreasing	95.9	Decreasing	98.8
MW142	Probably Increasing	90.8	Increasing	>99.9	Increasing	99.2
MW147*	Stable	54.8	Probably Decreasing	92.9	No Trend	86.2
MW149	Decreasing	97.7	Stable	73.7	Decreasing	98.4
MW272**	Probably Decreasing	92.9	Stable	47.8	No Trend	66.6

Note: *This well hasn't been sampled during the monitoring period.

** Outlier value from August 2021 not considered for the trend analysis.

The results of the plume stability analysis indicate no statistically significant trend at MW139 (source area) for PFOS, PFOA or Sum of PFOS and PFHxS. There were no detectable concentrations of PFOA, PFOS or the Sum of PFOS and PFHxS at this location during the monitoring period.

Directly downgradient bore, MW141 consistently reported the highest Sum of PFOS and PFHxS concentrations for the demolition ground area, over one order of magnitude above the HEPA (2020) recreational use criteria. PFOA concentrations were also recorded above the HEPA (2020) drinking water guideline value. No trend was reported for PFOS and PFOA while a decreasing trend was reported for Sum of PFOS and PFHxS. MW147 was not sampled (dry) during the monitoring period.

MW142 (shoreline) consistently reported exceedances of the recreational use criteria for the Sum of PFOS and PFHxS and the drinking water guideline value for PFOA. MW142 displayed increasing PFAS trends with high confidence factors. It is however noted that concentrations remained within the same order of magnitude during the monitoring period and within historical ranges. MW272 (shoreline) reported no trend for PFAS concentrations, however, a significant increase in Sum of PFOS and PFHxS and PFOA was reported in Q3 2021, from consistently below the LOR to above the assessment criteria. Further ongoing monitoring at this location is necessary to confirm if this was an outlier and will require reinstallation of MW272 which was lost following the August/September 2021 event. Other shoreline wells MW139 and MW149 reported stable or decreasing PFAS trends.

The following changes in trends from the 2020 AIR were noted with the additional 2021 monitoring data:

- MW137 PFOA trend changed from probably increasing to no trend.
- MW139 PFOS trend changed from no trend to probably decreasing.

- MW141 PFOA trend changed from increasing to stable, PFOA trend changed from probably increasing to decreasing, and Sum of PFOS and PFHxS trend changed from stable to decreasing.
- MW142 PFOS trend changed from no trend to probably increasing.
- MW272 PFOS trend changed from no trend to probably decreasing.

Porewater & surface water

The results (decreasing trends at source wells MW139 and MW141 and increasing trend at downgradient well MW142) seem to indicate that the PFAS plume in groundwater is moving towards the north-east. However, given no detectable PFAS concentrations were recorded at any of the porewater or surface water locations, it is concluded that dilution in sea water is occurring which is consistent with the previous monitoring period. This is supported by higher TDS and EC readings at the porewater locations and monitoring wells near the coastline indicating a mixing of groundwater with saline seawater.

Sediment

No detectable concentration of PFAS was reported at any of the sediment monitoring locations downgradient of the demolition ground which is consistent with the previous monitoring period.

8.3 Waste Water Treatment Plant

The spatial extent of groundwater, pore water and surface water Sum of PFOS and PFHxS concentrations at the WWTP is shown (Appendix A) on Figure 8B (Dec-20), Figure 9B (Mar-21), Figure 10B (Jun-21) and Figure 11B (Sept-21). The sediment results are shown on Figure 12B (Dec-20), Figure 13B (Mar-21), Figure 14B (Jun-21) and Figure 15B (Sept-21).

The WWTP is located at the centre of Garden Island. Groundwater flow is interpreted to be radial for this area and therefore, monitoring locations are positioned both on the east and west of the WWTP.

Groundwater

Wells MW171, MW172, MW173, MW193, MW195S and MW195D are located around the WWTP. MW161 and MW166 are located adjacent to the seepage ponds. MW158, MW196, MW199 and MW203 are situated between the WWTP and the shoreline to the east. MW197, MW200, and MW202 are located along the coastline to the east/southeast of the WWTP.

It is noted that MW172 was previously only sampled once (analysed for PFOA only) and was found dry during the monitoring period.

Table 8-3 Mann-Kendall Trend Analysis Summary – WWTP

Location	PFOS Trend	Confidence Factor (%)	PFOA Trend	Confidence Factor (%)	Sum of PFOS & PFHxS Trend	Confidence Factor (%)
MW158	No Trend	69.4	Stable	46.0	No Trend	69.4
MW161	Stable	62.6	Increasing	97.3	Stable	58.5
MW166	Probably Increasing	94.3	No Trend	76.4	Increasing	97.5
MW171	Probably Decreasing	92.4	Decreasing	99.3	Decreasing	99.0
MW173	Increasing	100	Increasing	99.5	Increasing	97.0
MW193	No Trend	61.7	No Trend	64.0	No Trend	87.4
MW195D	No Trend	46.0	No Trend	76.2	No Trend	84.6
MW195S	No Trend	70.5	No Trend	74.1	Decreasing	97.9
MW196	Stable	37.9	Stable	37.9	Stable	76.4
MW197	No Trend	68.1	No Trend	77.7	Decreasing	97.4
MW199	No Trend	72.7	Stable	55.4	No Trend	79.0
MW200	No Trend	74.1	Stable	58.5	No Trend	74.1
MW202	Stable	87.4	Stable	72.5	Decreasing	99.4

Location	PFOS Trend	Confidence Factor (%)	PFOA Trend	Confidence Factor (%)	Sum of PFOS & PFHxS Trend	Confidence Factor (%)
MW203	No Trend	50.0	Stable	46.0	No Trend	87.0

Note: MW172 was not sampled during the monitoring period (dry)

MW161, MW166, MW173 and MW193 (all located west of the WWTP) were consistently recorded above the HEPA (2020) recreational use criteria for the Sum of PFOS and PFHxS (within one order of magnitude). The other wells remained within one order of magnitude of the LOR for the Sum of PFOS and PFHxS. This suggests a westerly migration of PFAS from the WWTP.

No PFAS trends were reported at monitoring wells MW193 and 195D, located around the WWTP. A decreasing trend was reported for Sum of PFOS and PFHxS at MW195S, and for PFOS, PFOA and Sum of PFOS and PFHxS at MW171. Increasing PFAS trends were reported at MW173, located to the immediate west of the WWTP, which provides further evidence to the westerly plume migration identified above.

Monitoring wells, MW161 and MW166, located adjacent to the seepage ponds and west of the WWTP displayed increasing trends for PFOA (MW161), PFOS (MW166) and Sum of PFOS and PFHxS (MW166) with high confidence factors.

MW202 and MW203 are considered cross-gradient of the source area. Those wells display a decreasing Sum of PFOS and PFHxS trend (MW202) and no discernible trend (MW203) which is consistent with the previous monitoring period.

The trends observed at the WWTP were generally consistent with the 2020 AIR.

Porewater

PW350, PW401, PW380, PW351, PW381 and PW352 are located on the west shoreline, down-gradient of the WWTP and seepage ponds. PW369, PW367 and PW345 are located on the eastern shoreline.

With exception of PW352, detectable concentrations of the Sum of PFOS and PFHxS were recorded at all these porewater locations during the monitoring period. The greatest concentrations were reported in December 2020 at PW367 (0.13 µg/L) and PW369 (0.69 µg/L) on the eastern coastline and in Q3 2021 at PW380 (0.14 µg/L) on the western coastline. These increased concentrations appeared to be temporally isolated when compared to concentrations reported in prior and/or subsequent monitoring events.

Surface water

Surface water PFAS concentrations were generally not detected above the LOR or at detectable concentrations within one order of magnitude of the LOR with the following exceptions:

- SW382 (western shoreline) reported an exceedance of the drinking water criteria for the Sum of PFOS and PFHxS in Q3 2021. This is consistent with the increased concentration reported in PW380 on the eastern shoreline in the same monitoring event. All prior monitoring events did not record concentrations above the LOR, therefore further ongoing monitoring is required to confirm if an increasing PFAS trend is occurring.
- SW305 and SW371 (eastern shoreline) reported exceedances of the drinking water criteria for the Sum of PFOS and PFHxS in December 2020. The concentrations at both locations appeared to decrease over time from March 2021, to below the LOR in June and September 2021.

No other change from the 2020 monitoring data was noted.

Sediment

Sediment PFAS concentrations were generally not detected above the LOR, or at detectable levels of the same order of magnitude as the LOR which is consistent with the previous monitoring period. It is interpreted that PFAS don't accumulate within the sediment at the site and the primary transport media is groundwater.

8.4 Helicopter Support Facility

The spatial extent of groundwater, pore water and surface water Sum of PFOS and PFHxS concentrations at the HSF is shown (Appendix A) on Figure 8C (Dec-20), Figure 9C (Mar-21), Figure 10C (Jun-21) and Figure 11C (Sept-21). The sediment results are shown on Figure 12C (Dec-20), Figure 13C (Mar-21), Figure 14C (Jun-21) and Figure 15C (Sept-21).

Groundwater

Wells MW216, MW217, MW220, MW224 and MW282 are targeting the HSF source area. MW214, MW215, MW225 and MW226 are located between the source area and the shore. Monitoring well MW220, MW214, MW215, and MW225 were dry three events of the four monitoring events.

Table 8-4 Mann-Kendall Trend Analysis Summary – Helicopter Support Facility

Location	PFOS Trend	Confidence Factor (%)	PFOA Trend	Confidence Factor (%)	Sum of PFOS & PFHxS Trend	Confidence Factor (%)
MW216	Increasing	100	Increasing	>99.9	Increasing	99.3
MW217	Decreasing	99.8	Probably Increasing	94.4	Decreasing	99.8
MW220	Probably Increasing	93.2	Increasing	98.5	Increasing	96.5
MW224	Probably Decreasing	91.0	Stable	46.0	No Trend	82.1
MW225	No Trend	71.9	Stable	37.9	Stable	37.9
MW226	Probably Decreasing	90.4	Stable	62.6	Decreasing	100.0
MW227	Decreasing	97.5	Stable	47.6	Decreasing	97.5
MW228	No Trend	70.5	No Trend	74.1	Increasing	99.8
MW282	Decreasing	97.9	Decreasing	98.5	Decreasing	99.5

Note: MW214 and MW215 were not sampled during 3 out of 4 events of the monitoring period (dry) therefore insufficient data is available for Mann-Kendall analysis (minimum of 4 results required).

The results of the plume stability analysis for the HSF are variable depending on the location and analyte screened. This is considered to be due to the high variability of results in this area, with concentrations varying from generally below LOR at MW224, MW226 and MW227 (south of HSF and eastern shoreline) to two orders of magnitude above the HEPA (2020) recreational use criteria at MW282 (south of HSF). While new concentration maximums were recorded for PFOA at MW220 and MW228 during the monitoring period, no statistically significant trend can be established based on the current dataset.

An increasing trend for PFAS with high confidence factors was reported at MW216, located to the immediate west of the main HSF infrastructure. A probably increasing (CF=94.3%) trend was reported for PFOA at MW217 and an increasing trend (CF=96.5%) was reported for Sum of PFOS and PFHxS at MW224, both located on the eastern portion of the HSF. Decreasing Sum of PFOS and PFHxS trends were reported for MW217, MW226, MW227 and MW282.

A higher number of wells display statistically significant trends than reported in the 2020 AIR. These are as follows:

- MW216 displays an increasing trend of Sum of PFOS and PFHxS (previously no trend).
- MW217 displays a probably increasing trend of PFOA (previously no trend) and decreasing trends of PFOS and Sum of PFOS and PFHxS (previously stable).
- MW220 displays potentially increasing and increasing trends for all analytes (previously no trends).
- MW224 displays a probably decreasing trend of PFOS (previously no trend) and no statistically significant trend for Sum of PFOS and PFHxS (previously increasing).
- MW226 displays a probably decreasing trend of PFOS (previously stable).
- MW228 display an increasing trend of Sum of PFOS and PFHxS (previously no trend).
- MW282 display decreasing trends for all analytes under review.

Porewater

A number of Sum of PFOS and PFHxS detections (within the same order of magnitude as the LOR) were reported at porewater locations along the southern shore (PW308 and PW315), eastern shore (PW405 and PW409) and south-eastern shore (PW415). A detection above the drinking water guideline was reported at

PW316 (0.1 µg/L), located on the southern shore. All detections in porewater were isolated occurrences and generally of the same order of magnitude as the LOR indicating that dispersion and dilution mechanisms are occurring and no lasting PFAS concentrations remain in the receiving environment. There was more detections recorded during the 2021 monitoring period than the 2020 one which also indicates a plume migration towards the coast.

Surface water

All HSF surface water samples did not detect PFAS concentrations above the LOR with the exception of SW414 (March 2021, Sum of PFOS and PFHxS = 0.04 µg/L) and SW406 (March 2021, Sum of PFOS and PFHxS = 0.02 µg/L) located to the south-east and east. These two detections were isolated occurrences, and the two subsequent monitoring events didn't record any PFAS detection above LOR.

Sediment

All HSF sediment samples did not detect PFAS concentrations above the LOR with the exception of SD405 (September 2021, Sum of PFOS and PFHxS = 0.0003 mg/kg) and SD409 (June 2021, Sum of PFOS and PFHxS = 0.0011 mg/kg) located to the east. These are no major changes from the 2020 data.

Given the above observations, it is interpreted that the PFAS plume at the HSF is relatively stable, with possible migration to the southern, eastern and south-eastern shorelines. However, it is noted that limited groundwater information is available to the west of the HSF source area.

8.5 AVCAT Storage, fuel farm and infiltration swale

The spatial extent of groundwater, pore water and surface water Sum of PFOS and PFHxS concentrations at the AVCAT storage, fuel farm and infiltration swale are shown (Appendix A) on Figure 8C (Dec-20), Figure 9C (Mar-21), Figure 10C (Jun-21) and Figure 11C (Sept-21).

Groundwater only is monitored for the AVCAT storage, fuel farm and infiltration swale as other sources are present closer to the shoreline.

Table 8-5 Mann-Kendall Trend Analysis Summary – AVCAT storage, fuel farm and infiltration swale

Location	PFOS Trend	Confidence Factor (%)	PFOA Trend	Confidence Factor (%)	Sum of PFOS & PFHxS Trend	Confidence Factor (%)
Infiltration Swale						
MW233	Stable	88.3	Decreasing	96.9	Decreasing	96.9
Fuel Farm						
MW236	Increasing	97.1	Increasing	95.6	Increasing	98.2
AVCAT Storage						
MW238	Decreasing	95.5	Stable	47.8	Stable	54.3
MW239	No Trend	66.7	Stable	37.9	No Trend	61.4
MW240	No Trend	79.2	No Trend	65.7	Stable	46.0
MW242	No Trend	69.4	Stable	46.0	Stable	50.0
MW243	No Trend	74.1	Decreasing	96.0	No Trend	60.6
MW245	Decreasing	>99.9	Decreasing	99.0	Decreasing	100.0
MW516	Stable	80.9	Stable	64.0	Stable	80.9
MW248	Probably Increasing	91.8	Increasing	96.2	Increasing	95.6
MW249	Decreasing	99.8	Decreasing	99.8	Decreasing	100.0

The infiltration swale monitoring well, MW233 consistently reported Sum of PFOS and PFHxS concentrations one order of magnitude above the drinking water guideline value but below the recreation guideline. However, a decreasing trend for PFOS or Sum of PFOS and PFHxS was established for this well, as well as for PFOA.

The fuel farm well, MW236 is displaying an increasing trend with a very high confidence factor. Concentrations of the Sum of PFOS and PFHxS remained within the historical range, an order of magnitude above the recreation criteria. The greatest Sum of PFOS and PFHxS concentrations have been consistently reported at this well.

The plume stability analysis at the AVCAT storage area indicates no statistically significant trends within the source area. Decreasing PFAS trends are reported for MW245 and MW249 (east of source area) and increasing PFAS trends are reported at MW248 (south of source area). The greatest Sum of PFOS and PFHxS concentrations in the AVCAT storage wells were reported at MW240 (source area), MW516 and MW248 (south of source area). These results suggest a southern and slight eastern migration of the PFAS plume. No major changes are noted in comparison to the 2020 AIR interpretation.

8.6 Fire Station, dredge spoil and ship sullage area

The spatial extent of groundwater, pore water and surface water Sum of PFOS and PFHxS concentrations at the Fire station and ship sullage area is shown (Appendix A) on Figure 8C (Dec-20), Figure 9C (Mar-21), Figure 10C (Jun-21) and Figure 11C (Sept-21).

Groundwater

All the wells are targeting a specific source area:

- MW517, MW255 and MW256 are located at the Fire Station;
- MW257, MW258 (dry) and MW259 are located at the flammable / hazardous goods and waste storage area;
- MW264, MW268 and MW269 are targeting the dredge spoil; and
- MW518, MW261 and MW010 are located at the ship sullage area.

Table 8-6 Mann-Kendall Trend Analysis Summary – Fire Station, dredge spoil and ship sullage area

Location	PFOS Trend	Confidence Factor (%)	PFOA Trend	Confidence Factor (%)	Sum of PFOS & PFHxS Trend	Confidence Factor (%)
Fire Station						
MW517	Probably Decreasing	90.7	Stable	37.9	Prob. Decreasing	90.7
MW255	Decreasing	96.3	Decreasing	97.4	No Trend	72.7
MW256	Increasing	97.9	Increasing	100	Increasing	98.5
Flammable / hazardous goods and waste storage area						
MW257	No Trend	79.1	Probably Increasing	94.4	No Trend	88.3
MW258*	No Trend	76.5	Stable	39.3	No Trend	89.8
MW259	Decreasing	99.7	Decreasing	>99.9	Decreasing	99.7
Ship sullage area						
MW010	Increasing	95.2	Stable	39.3	No Trend	59.2
MW518	No Trend	76.4	Stable	47.9	No Trend	50.0
MW261	Probably Decreasing	91.8	Stable	45.6	Increasing	97.5
Dredge spoil						
MW264	Stable	56.4	Decreasing	97.9	Stable	58.5
MW268	Probably Decreasing	92.9	Decreasing	99.6	Probably Decreasing	92.1
MW269	No Trend	84.8	No Trend	82.1	Increasing	97.6

Note: *This well hasn't been sampled during the monitoring period.

The Fire Station wells, MW255 and MW256 recorded concentrations above the HEPA (2020) recreational use criteria while MW517, up-gradient of the above-mentioned locations, recorded concentrations below or

within one order of magnitude of the LOR. A spike in Sum of PFOS and PFHxS and PFOA concentrations was reported at MW256 (east of the source area) in Q2 2021, followed by a decrease in Q3 2021. Continued monitoring is required to determine whether the increasing trend reported at this well will be confirmed in future monitoring events. MW255 and MW517 are now displaying decreasing trends where the 2020 AIR reported increasing or no trends.

Flammable/hazardous goods and waste storage area monitoring well, MW259 reported decreasing PFAS trends. Concentrations at MW257 were within historical range with the exception of the September 2021 sample (Sum of PFOS and PFHxS=0.98 µg/L, PFOA=0.12 µg/L). MW258 was found dry at all events of the monitoring period. No change were noted from the 2020 AIR data.

Ship sullage area well, MW261 displays an increasing Sum of PFOS and PFHxS trend but a probably decreasing tend of PFOS. It is noted that MW518 was recently installed (monitored from March-20). A stable trend of PFOA was established at MW518.

Wells targeting the dredge spoil display an increasing trend of Sum of PFOS and PFHxS at MW269 (east of source area) and a probably decreasing trend at MW268 (previously probably increasing).

Porewater/Sediment and Surface water

Porewater/sediment and surface water are monitored at Careening Bay, south of the above-mentioned source areas. All porewater locations were within historical concentration ranges during the monitoring period. Marginal detections of Sum of PFOS and PFHxS were reported at SD374, SD375 and SD378. A new exceedance of guideline value was noted at PW375 on the shoreline downgradient of MW268.

Surface water samples did not detect PFAS concentrations above the LOR.

The observations from porewater, sediment and surface water monitoring indicate that PFAS is leaching from the up-gradient source areas with groundwater, however, has not impacted the surface water along the Careening Bay coastline.

8.7 Accommodation Area

The spatial extent of groundwater, pore water and surface water Sum of PFOS and PFHxS concentrations at the Accommodation Area is shown (Appendix A) on Figure 8C (Dec-20), Figure 9C (Mar-21), Figure 10C (Jun-21) and Figure 11C (Sept-21).

Groundwater

MW289 targeting the accommodation area generally recorded Sum of PFOS and PFHxS concentrations of the same order of magnitude as the HEPA (2020) recreational use criteria. The Mann-Kendall analysis indicates this well displays a stable trend. MW288 was found dry during in two of the four quarterly events and displays no statistically significant trend.

Table 8-7 Mann-Kendall Trend Analysis Summary – Accommodation Area

Location	PFOS Trend	Confidence Factor (%)	PFOA Trend	Confidence Factor (%)	Sum of PFOS & PFHxS Trend	Confidence Factor (%)
MW288	Stable	80.1	Stable	80.1	Stable	86.2
MW289	Stable	87.5	No Trend	58.0	Stable	82.1

Porewater/Sediment

One single co-located porewater/sediment location (PW/SD346) is monitored down-gradient of the identified source area. Exceedances of the HEPA (2020) recreational use criteria for the Sum of PFOS and PFHxS were recorded at PW346 in December 2020. SD346 detected Sum of PFOS and PFHxS in all monitoring events, however concentrations remained within the historical range and below the Ecological criteria for indirect exposure (0.01 mg/kg).

Surface water

Surface water is not monitored directly down-gradient of the identified source area, however, SW305, SW372 and SW373 to the north have consistently reported detectable PFOS concentration and therefore exceedances of the HEPA (2020) ecological criteria for 99% species protection. This is likely related to the WWTP source area.

8.8 Summary

A summary of the maximum Sum of PFOS and PFHxS concentrations historically recorded and the maximum concentrations recorded during the monitoring period are presented in Table 8-8 for each media assessed and investigation area.

Table 8-8 Maximum detected Sum of PFOS and PFHxS concentrations

Investigation Area	Sum of PFOS and PFHxS maximums				
	Phase	Groundwater (µg/L)	Porewater (µg/L)	Surface water (µg/L)	Sediment (µg/L)
Fire Training Area	historical	83.9	0.023	0.07	0.0002
	2020-21	87.9	0.28	0.05	0.0005
Demolition Ground	historical	147	0.025	0.001	<0.0001
	2020-21	116	<0.01	<0.01	<0.0002
WWTP	historical	21.7	4.44	0.56	0.0006
	2020-21	13.4	0.69	0.31	0.0017
Helicopter Support Facility	historical	243	0.02	0.01	0.0003
	2020-21	94	0.1	0.04	0.0011
AVCAT storage and Fuel farm	historical	87.5	-	-	-
	2020-21	71.2	-	-	-
Fire Station, dredge spoil and ship sullage area	historical	30.9	0.44	0.13	<0.0001
	2020-21	75	0.05	<0.01	0.0005
Accommodation Area	historical	13.1	5.62	-	0.0116
	2020-21	6.59	3.16	-	0.0096

It is noted that concentrations maximums are of the same order of magnitude as historical data with the following exceptions:

- Fire Training Area: porewater maximum was an order of magnitude greater than the historical data.
- Demolition Ground: The porewater and surface water results did not detect any Sum of PFOS and PFHxS concentration above the LOR during the monitoring period.
- WWTP: The maximum concentrations in porewater down gradient of the WWTP was one order of magnitude below these historically recorded. Maximum concentrations in sediment down gradient of the WWTP were one order of magnitude above these historically recorded.
- HSF: The maximum porewater and sediment concentrations were an order of magnitude greater than recorded during the investigation phase for a second year in a row. Groundwater maximum was one order of magnitude lower than historical data.
- Fire Station, dredge spoil and ship sullage area: The maximum porewater and surface water concentration was an order of magnitude lower than the historical data.
- Accommodation Area: All concentrations remained comparable to the 2020 monitoring period where an increase in porewater concentrations down gradient of the accommodation was noted when compared to the investigation phase.

9 Conceptual Site Model (CSM)

A Review of the CSM presented in the PMAP (Defence, 2019) has been undertaken.

The evaluation of analytical results within this report does not suggest the nature and extent of PFAS in groundwater, porewater, surface water or sediment has significantly changed compared to that inferred from previous reporting. No new pathway, exposure scenario or potential receptors were identified.

An update of the CSM is however required to include the new source areas identified (GHD, 2020).

10 Discussion

The potential exposure pathways for human health and ecological receptors identified during the DSI (RPS, 2018a) and ERA (RPS, 2018b) have been reviewed in light of the monitoring data obtained during the monitoring period.

As stated in the PMAP, "*Contaminant fate and transport modelling (calculated to 2100) indicates that PFAS concentrations are expected to increase along the coastline to the future*". The observations made since the start of the OMP implementation confirm this indication. Concentrations in surface water and/or porewater have been recorded one to two orders of magnitude above the investigation phase's dataset.

Groundwater levels were generally consistent between monitoring events, with average SWL readings of 0.369 mAHD in December 2020 and March 2021, and 0.372 mAHD in June 2021 and September 2021. The groundwater hydraulic gradient at the site has been observed to be relatively low and unlikely to result in significant groundwater flow rate (Greencap, 2019).

Exceedances of the drinking water guideline for Sum of PFOS and PFHxS were reported within the monitoring period for porewater samples downgradient of the HSF (PW316), FTA (PW340 and PW362), WWTP (PW367, PW369, PW380), dredge spoil and careening bay (PW374) and accommodation (PW346).

The pathways for PFAS exposure and risks to human health and ecological receptors presented in the investigation phase (RPS, 2018a, b) are considered to be relevant and data presented in this report does not suggest any significant changes to these mechanisms or risks.

10.1 Risk Profile

No elevated risks requiring specific management actions were identified in the PMAP following completion of the DSI (RPS, 2018a) and ERA (RPS, 2018b). It is however noted that abstraction of groundwater on Garden Island is restricted for potential future use due to the presence of PFAS (PMAP, Defence, 2019).

There is no significant change to the risk profile of the Management Area based on the current available data based on the following lines of evidence:

- Detections of PFAS in porewater and surface water have been observed downgradient of several source areas, including the FTA, WWTP, HSF, Careening Bay and Accommodation area. The detections in porewater and surface water were generally lower than in the groundwater wells, indicating that where PFAS is migrating with groundwater towards the coastline, dilution in sea water is occurring. This is supported by the geochemical parameters' records showing a salinity increase in porewater and surface water when compared to groundwater.
- Exceedances of the drinking water guideline for Sum of PFOS and PFHxS were reported within the monitoring period for surface water samples downgradient of the WWTP (SW305, SW371, SW373 and SW382). All surface water concentrations were below the HEPA (2020) recreational use criteria and therefore do not present a risk to recreational users.
- The ERA (RPS, 2018a) concluded that adverse effects to ecological receptors were not expected to occur even though "*contaminant fate and transport modelling predicts that future concentrations of PFOS along the shore may significantly increase*". This conclusion was based on a PFAS fate and transport modelling assessment to predict PFAS concentrations and loading from groundwater at the coast until 2100 (RPS, 2018a). Some increase in PFOS concentrations have been observed, including the first detections and new exceedances reported in Section 7 and discussed in Section 8 of this AIR. However, based on the ERA modelling, these are not considered to change the risk profile of the management area or to warrant further management actions.

Additionally, the recreational use criterion was exceeded in porewater downgradient of the accommodation (PW346) in December 2020. The exceedance was less than one order of magnitude above the criteria and showed to decrease in the subsequent monitoring events to below the recreation criterion (whilst still above the drinking water guideline). It is expected that dilution will occur with sea water, and given the isolated occurrence it is not considered that an exposure pathway is present. However, ongoing monitoring at this porewater location and nearby surface water locations should be continued to assess the potential risk to human health and/or the environment.

10.2 Triggers for OMP review

The OMP is to be reviewed annually considering existing trend data available to tailor the monitoring program to site-specific characteristics. A review of the OMP may be required for several reasons including (but not limited to):

- Policy changes, regulatory requirements or regulator advices;
- Feedback and information received as part of stakeholder engagement activities;
- A change in the understanding of the risk for the Site;
- Significant changes of land use within the Management Area or at close proximity;
- Impacts of remediations works; and
- The requirements of a post-remediation Site Management Plan.

The newly identified potential PFAS sources (GHD, 2020) should trigger a review of the OMP to ensure these areas are adequately monitored.

In addition, and as detailed in Section 3.2, some changes to the groundwater monitoring network have been noted since the OMP and should be incorporated in a revised OMP.

Furthermore, the initial 24-month implementation period has been reached which triggers a review of the OMP.

11 Conclusions

Cardno implemented the PFAS OMP at HMAS Stirling (Garden Island) which comprised sampling and testing of groundwater, porewater, surface water and sediment. The 2020-21 monitoring program consisted of four quarterly monitoring events (undertaken in December 2020, March 2021, June 2021, September 2021).

The purpose of this Annual Interpretive Report was to:

- Inform Defence and key stakeholders of PFAS trends in surface water, porewater groundwater and sediment.
- Assess any variations in the distribution of PFAS for the Management Area and how this changes the understanding of the conceptual site model and risk profile.

Recommendations for any potential changes in the location and frequency of sampling which may be incorporated in the revision of the OMP will be provided to Defence under a separate cover if required.

The 2020-2021 OMP monitoring was undertaken in accordance with the SAQP and is considered to have met the objectives of the OMP.

Groundwater

237 groundwater samples were collected during the monitoring period. Analytical results show Sum of PFOS and PFHxS concentrations ranging from below the laboratory LOR (0.01 µg/L) for 30% of the samples, to two orders of magnitude above the HEPA (2020) recreational use criteria (2.0 µg/L) at MW141 (demolition ground).

Concentrations were generally of the same order of magnitude as historical data for each groundwater monitoring location which indicates no changes in the nature of PFAS in groundwater. Plume stability analysis (Mann-Kendall statistical analysis) undertaken at each monitoring area, results are variable depending on the well and analyte under review. However, where a statistically significant trend could be established, it generally indicates a groundwater plume migration towards the coastline which is confirmed by new exceedances of guideline values reported for several monitoring locations (including porewater and surface water) along the shoreline.

Porewater

63% of the 156 porewater samples collected during the monitoring period did not detect concentrations above the laboratory LOR for the Sum of PFOS and PFHxS. Detectable concentrations ranged from 0.01 to 3.16 µg/L (PW346, accommodation area). The concentrations generally indicate dilution of the PFAS plume in groundwater, attributed to the tides.

Surface water

80% of the 112 surface water samples collected during the monitoring period did not detect concentrations above the laboratory LOR for the Sum of PFOS and PFHxS. 22 samples reported an exceedance of the HEPA (2020) ecological criteria for 99% species protection for PFOS (LOR value adopted) with detectable concentrations ranging from 0.01 to 0.37 µg/L (SW373, WWTP east coast). Findings are consistent with the ERA (RPS, 2018b) indicating that PFOS concentration were anticipated to increase in the future.

Sediment

Out of 156 sediment samples collected during the four events of the monitoring period, 32 were marginally above the LOR and no assessment criteria exceedances were reported. No changes in the nature and extent of PFAS in sediment are observed.

It is interpreted that PFAS are not accumulating within the sandy sediments at the site coastline. Dilution with porewater/sea water appears to be occurring faster than any binding mechanism.

Conceptual Site Model

A review of the CSM was undertaken based on the 2020-2021 data. No new exposure pathway, receptor or transport mechanism were identified.

Risk Summary

No change in the risk profile of the Management Area or a specific monitoring area was established. The risk posed by residual PFAS at the site remains a low risk to human health and ecological receptors based on the available data set.

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General References

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21. Cardno, August 2021, Reference: DEF19009, Rev4 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) HMAS Stirling' (Appendix B).
22. Cardno, September 2021, PFAS OMP – 2020 Annual Interpretive Report, HMAS Stirling
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25. Cardno, August 2021, PFAS OMP Quarterly Sampling Event Factual Report June 2021
26. Cardno, November 2021, PFAS OMP Quarterly Sampling Event Factual Report September 2021

27. Department of Defence, January 2019, HMAS Stirling Garden Island 'PFAS Management Area Plan'.
28. GHD, October 2019, Stage 1 Preliminary Site Investigation
29. GHD, June 2020, Stage 2 RCIP DSI (Mobilisation 1).
30. GHD, 2020, Stage 2 RCIP DSI Mobilisation Report June 2020 – PFAS Summary.
31. Greencap, November 2019, DSI B0086 Diamantina Pier Car Park, HMAS Stirling.
32. RPS, May 2018, Detailed Site Investigation – HMAS Stirling PFAS Investigation, Ref. EEC16094.003 (RPS, 2018a).
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APPENDIX

A

FIGURES

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now

Stantec

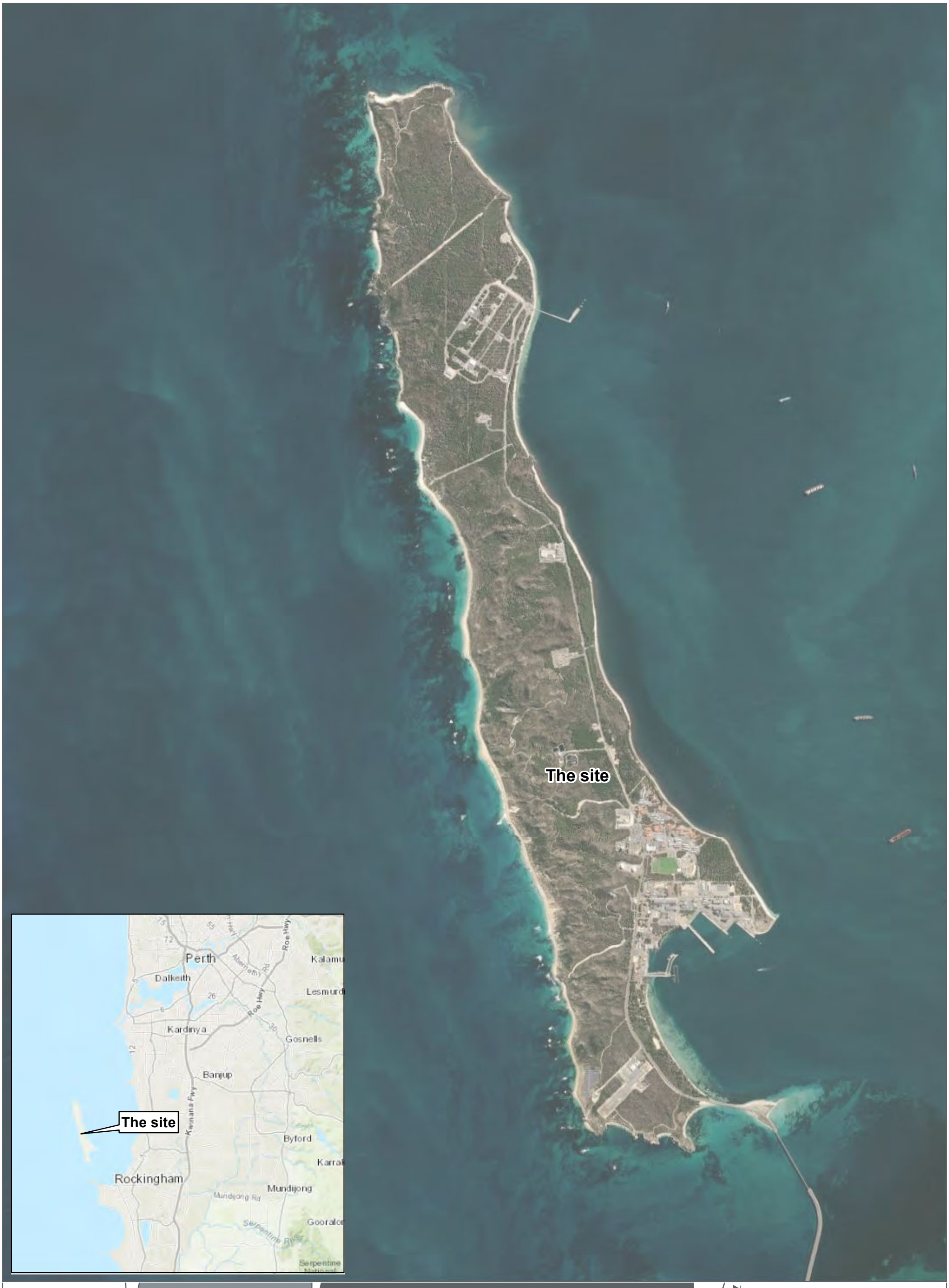

FIGURE 1

1:32,000 Scale at A3

Meters

0 500 1,000

Site Location

ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2022-09-15 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-001_RegionalLocation 03.mxd
Aerial Imagery Supplied by Google Earth

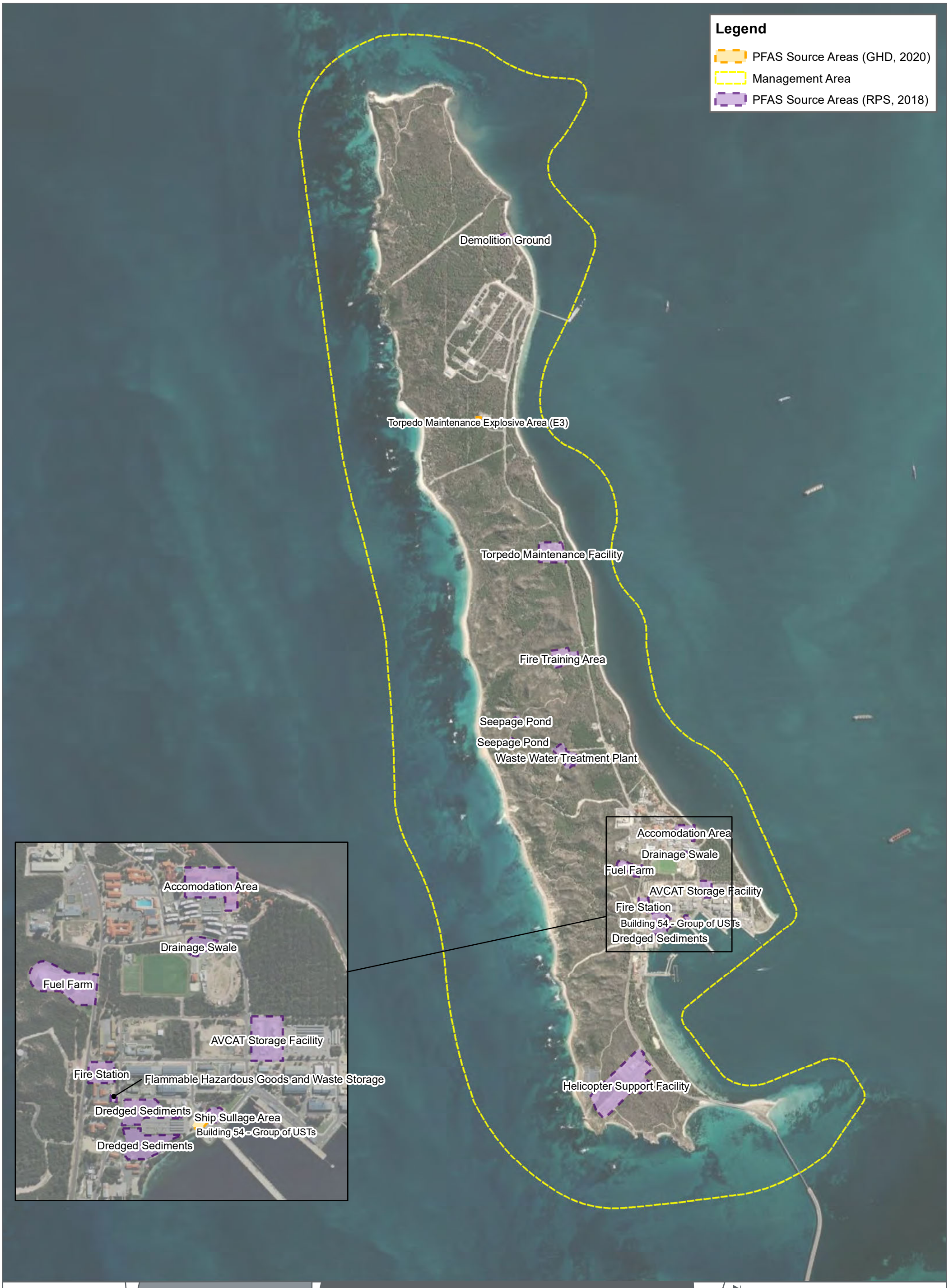

FIGURE 2

1:32,000 Scale at A3

Meters

0 500 1,000

Management Area

ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-11-26 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-002_ManagementArea 02.mxd
Aerial Imagery Supplied by Google Earth

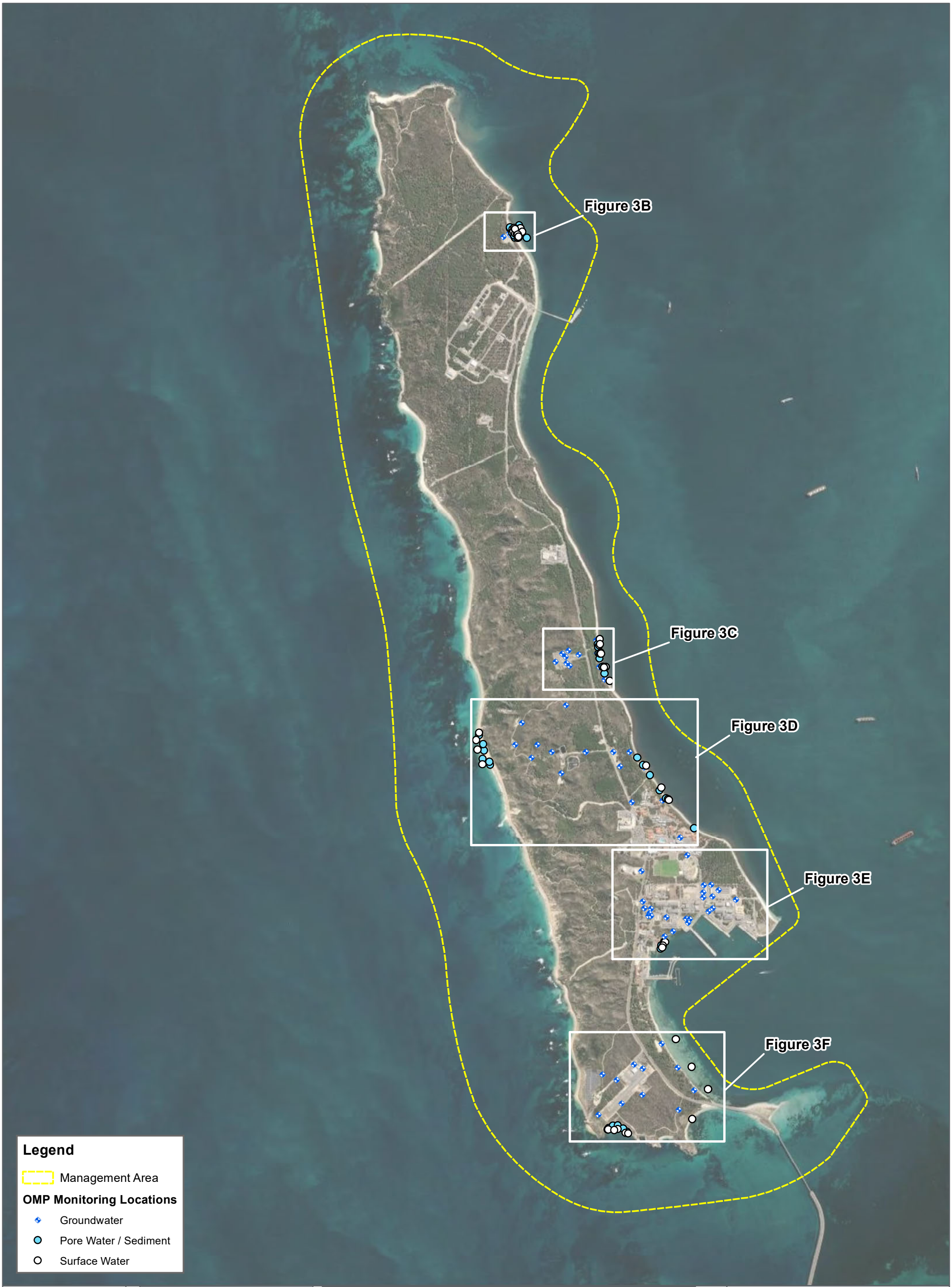

FIGURE 3A

1:32,000 Scale at A3

Meters

0 500 1,000

Monitoring Locations

ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2022-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003A_MonitoringLocations 03.mxd
Aerial Imagery Supplied by Google Earth

FIGURE 3B

1:750 Scale at A3

Meters

0 25 50

Monitoring Locations

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HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-11-26 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003B_DemolitionGroundLocations 03.mxd
Aerial Imagery Supplied by Nearmap

FIGURE 3C

1:2,000 Scale at A3

Meters

0 50 100

Monitoring Locations

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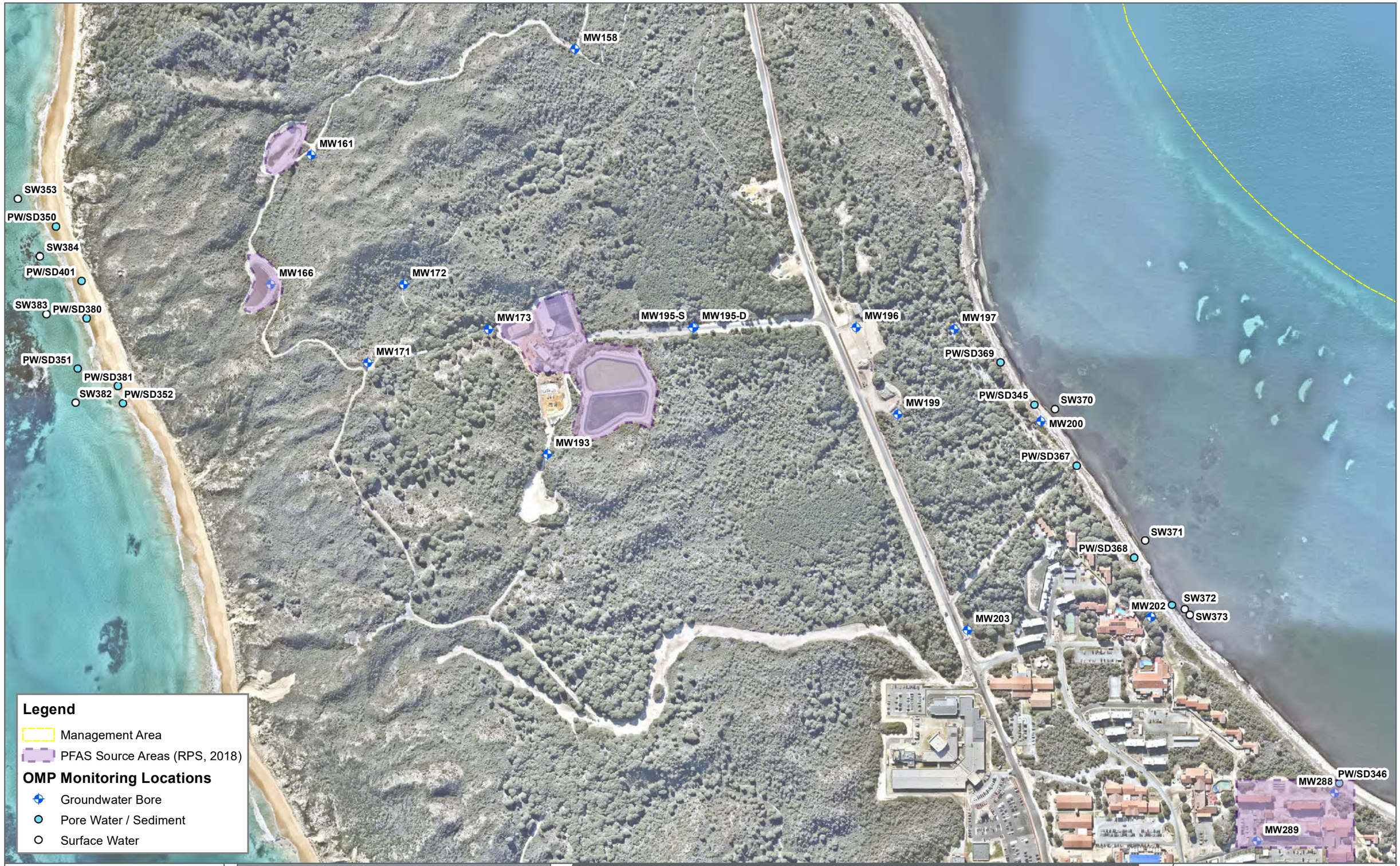
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-11-26 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003C_FireTrainingAreaLocations 03.mxd
Aerial Imagery Supplied by Nearmap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MW161
SW353
PW/SD350
SW384
PW/SD401
MW166
MW172
SW383
PW/SD380
MW173
MW195-S
MW195-D
MW196
MW197
MW171
PW/SD369
PW/SD351
PW/SD381
SW382
PW/SD352
PW/SD345
SW370
MW199
MW200
MW193
PW/SD367
SW371
PW/SD368
SW372
MW202
SW373
MW203
PW/SD346
MW288
MW289
Legend
Management Area
PFAS Source Areas (RPS, 2018)
OMP Monitoring Locations
Groundwater Bore
Pore Water / Sediment
Surface Water
FIGURE 3D
1:5,500 Scale at A3
Meters
0
100
200
Monitoring Locations
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
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Map Produced by Cardno WA
Date: 2022-03-23 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003D_WWTPLocations 03.mxd
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FIGURE 3E

1:3,900 Scale at A3

Meters

0 100 200

Monitoring Locations

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Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003E_MainBaseLocations 03.mxd
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FIGURE 3F

1:3,500 Scale at A3

Meters

0 100 200

Monitoring Locations

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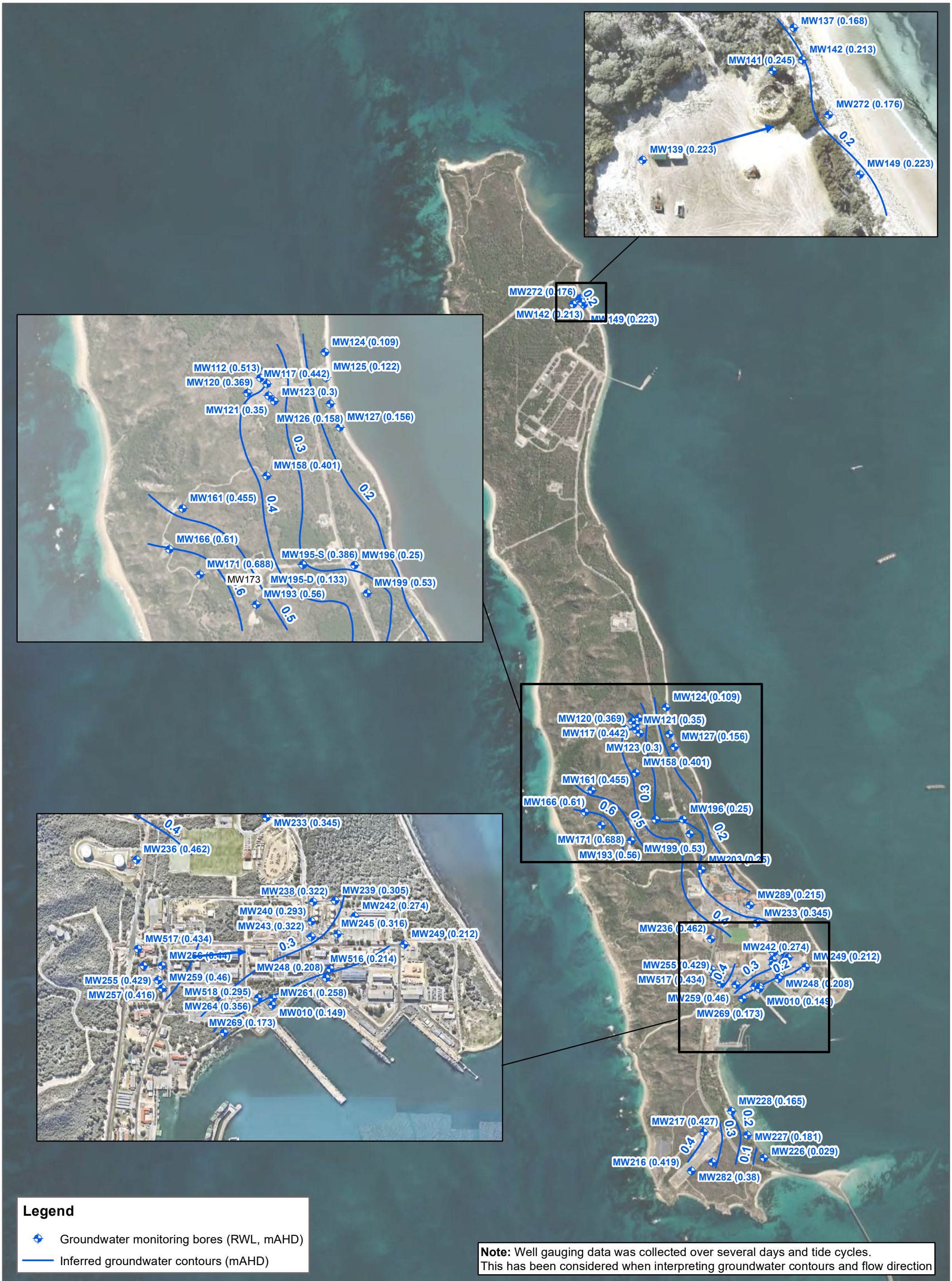
Date: 2022-03-23 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003F_HSFLocations 03.mxd
Aerial Imagery Supplied by Nearmap



Legend

- Groundwater monitoring bores (RWL, mAHD)
- Inferred groundwater contours (mAHD)

Note: Well gauging data was collected over several days and tide cycles.
This has been considered when interpreting groundwater contours and flow direction

FIGURE 4

1:32,000 Scale at A3

Meters

0 500 1,000

Dec-20 Inferred Groundwater Contours

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Map Produced by Cardno WA
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Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-004_2020Q4_GroundwaterContours 01.mxd
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FIGURE 5

1:32,000 Scale at A3

Meters

0 500 1,000

Mar-21 Inferred Groundwater Contours

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HMAS STIRLING
DEPARTMENT OF DEFENCE

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Map Produced by Cardno WA
Date: 2022-09-16 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-005_2021Q1_GroundwaterContours 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

MW137 (0.293)
MW142 (0.298)
MW272 (0.715)
MW149 (0.328)
MW139 (0.389)
0.3
MW139 (0.389)
MW124 (0.269)
MW125 (0.252)
MW120 (0.449)
MW127 (0.266)
MW123 (0.44)
MW158 (0.55)
MW161 (0.57)
MW166 (-0.2)
MW171 (0.846)
MW197 (0.37)
MW200 (0.395)
MW193 (0.73)
MW203 (0.415)
MW202 (0.735)
MW289 (0.555)
MW233 (0.782)
MW236 (0.632)
MW239 (0.519)
MW255 (0.579)
MW249 (0.254)
MW516 (0.368)
MW259 (0.58)
MW010 (0.324)
MW268 (0.392)
MW228 (0.555)
MW227 (0.473)
MW217 (0.567)
MW216 (0.577)
MW226 (0.649)
MW282 (0.53)
0.6
0.4
0.5
MW124 (0.269)
MW125 (0.252)
MW120 (0.449)
MW127 (0.266)
MW123 (0.44)
MW158 (0.55)
MW161 (0.57)
MW166 (-0.2)
MW171 (0.846)
MW197 (0.37)
MW200 (0.395)
MW193 (0.73)
MW203 (0.415)
MW202 (0.735)
MW289 (0.555)
MW233 (0.782)
MW236 (0.632)
MW239 (0.519)
MW255 (0.579)
MW249 (0.254)
MW516 (0.368)
MW259 (0.58)
MW010 (0.324)
MW268 (0.392)
MW228 (0.555)
MW227 (0.473)
MW217 (0.567)
MW216 (0.577)
MW226 (0.649)
MW282 (0.53)
0.6
0.4
0.5
MW124 (0.269)
MW125 (0.252)
MW120 (0.449)
MW127 (0.266)
MW123 (0.44)
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MW166 (-0.2)
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MW202 (0.735)
MW289 (0.555)
MW233 (0.782)
MW236 (0.632)
MW239 (0.519)
MW242 (0.509)
MW243 (0.526)
MW249 (0.254)
MW255 (0.579)
MW256 (0.61)
MW516 (0.368)
MW248 (0.328)
MW259 (0.58)
MW010 (0.324)
MW269 (0.415)
MW268 (0.392)
0.6
0.4
0.6

Legend

- Management Area
- Inferred Groundwater Contours
- Monitoring Locations RWL (mAHD)

Note: Well gauging data was collected over several days and tide cycles.
This has been considered when interpreting groundwater contours and flow direction

FIGURE 6

1:32,000 Scale at A3

Meters

0 500 1,000

Jun-21 Inferred Groundwater Contour

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HMAS STIRLING
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Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-006_2021Q2_GroundwaterContours 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

Legend

- Monitoring Locations RWL (mAHD)
- Inferred Groundwater Contours

Note: Well gauging data was collected over several days and tide cycles.
This has been considered when interpreting groundwater contours and flow direction

FIGURE 7

1:32,000 Scale at A3

Meters

0 500 1,000

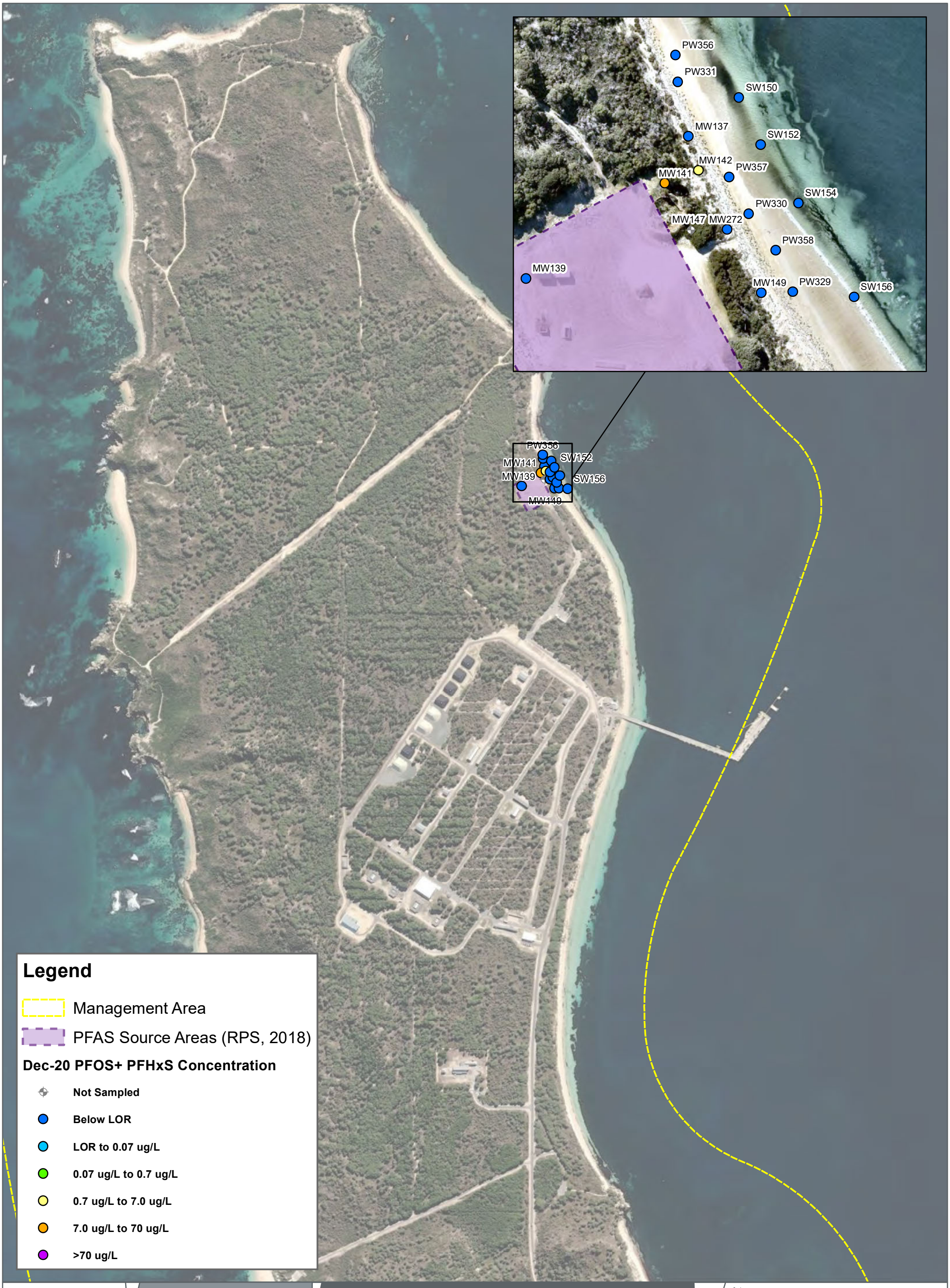
Sept-21 Inferred Groundwater Contours

ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2022-09-16 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-007_2021Q3_GroundwaterContours 03.mxd
Aerial Imagery Supplied by Google Earth & Nearmap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PW331
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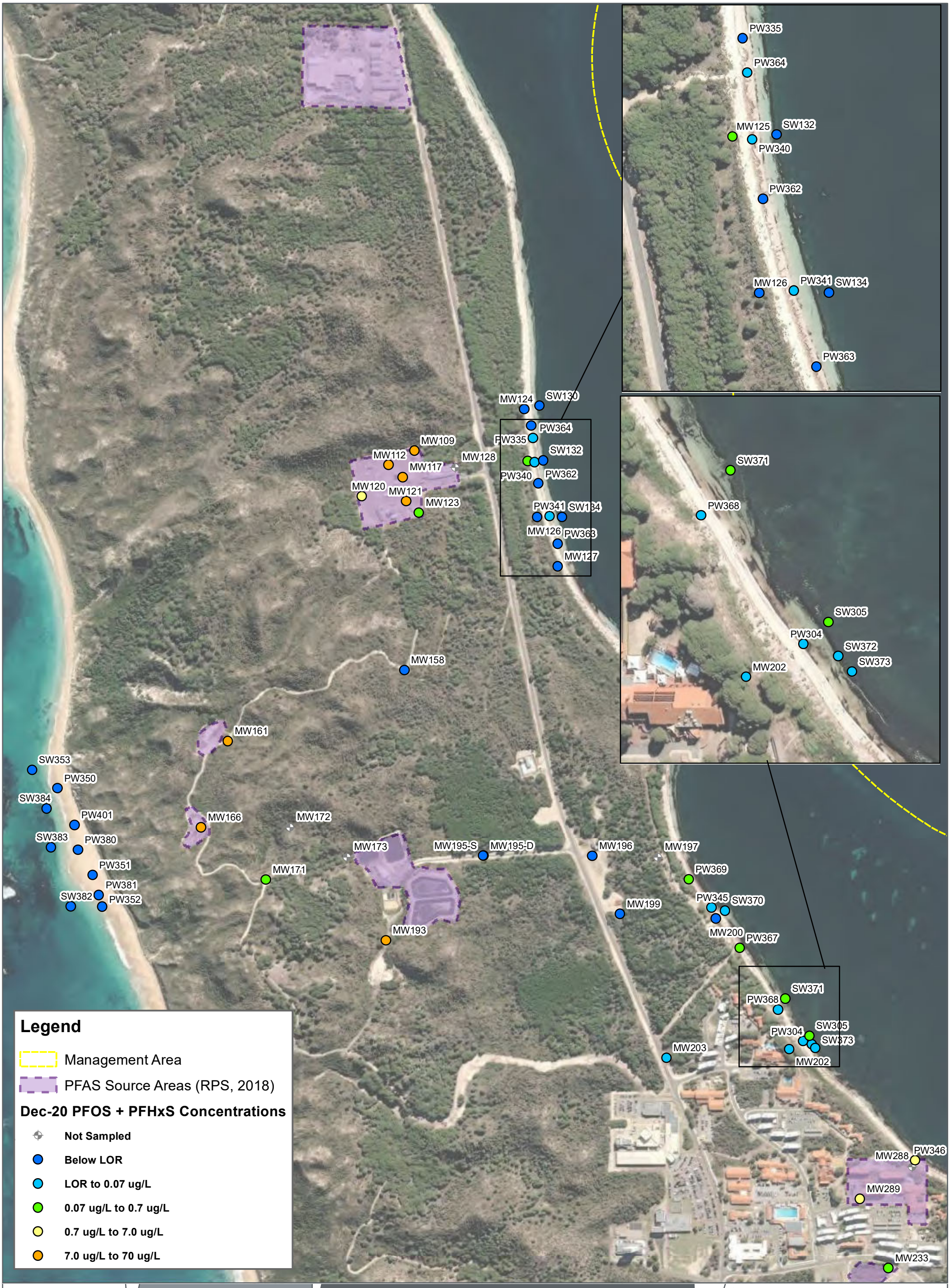
MW137
SW152
MW142
PW357
MW141
SW154
PW330
MW147
MW272
PW358
MW139
MW149
PW329
SW156
PW356
SW152
MW141
MW139
SW156
MW149
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Dec-20 PFOS+ PFHxS Concentration
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
>70 ug/L
FIGURE 8A
1:10,000 Scale at A3
Meters
0
200
400
PFOS+PFHxS Concentrations - December 2020
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2022-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-008A_PFOS+PFHxS_Dec20 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap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PW341
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MW126
PW363
MW127
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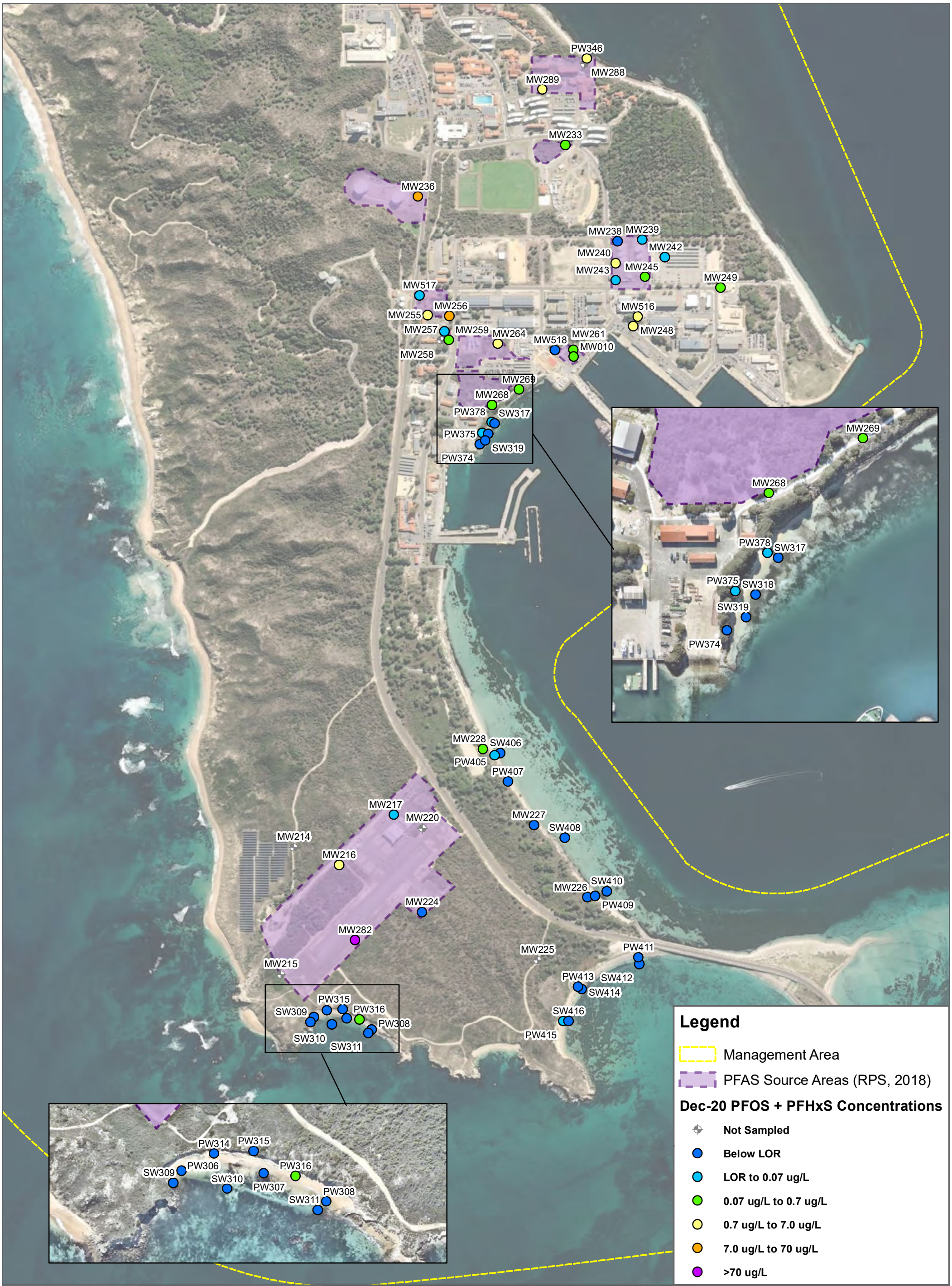
MW112
MW128
MW117
MW120
MW121
MW123
MW158
MW161
SW353
PW350
SW384
PW401
MW166
MW172
SW383
PW380
PW351
PW381
SW382
PW352
MW173
MW195-S
MW195-D
MW196
MW197
MW171
MW193
SW371
PW368
SW305
PW304
SW372
SW373
MW202
PW369
PW345
SW370
MW199
MW200
PW367
MW203
MW288
PW346
MW289
MW233
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Dec-20 PFOS + PFHxS Concentrations
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
FIGURE 8B
1:8,000 Scale at A3
Meters
0
200
400
PFOS+PFHxS Concentrations - December 2020
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2022-09-16 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-008B_PFOS+PFHxS_Dec20 01.mxd
Aerial Imagery Supplied by Google Earth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MW233
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MW257
MW259
MW264
MW248
MW518
MW261
MW010
MW258
MW269
MW268
PW378
SW317
PW375
SW319
PW374
MW269
MW268
PW378
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PW409
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PW411
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SW414
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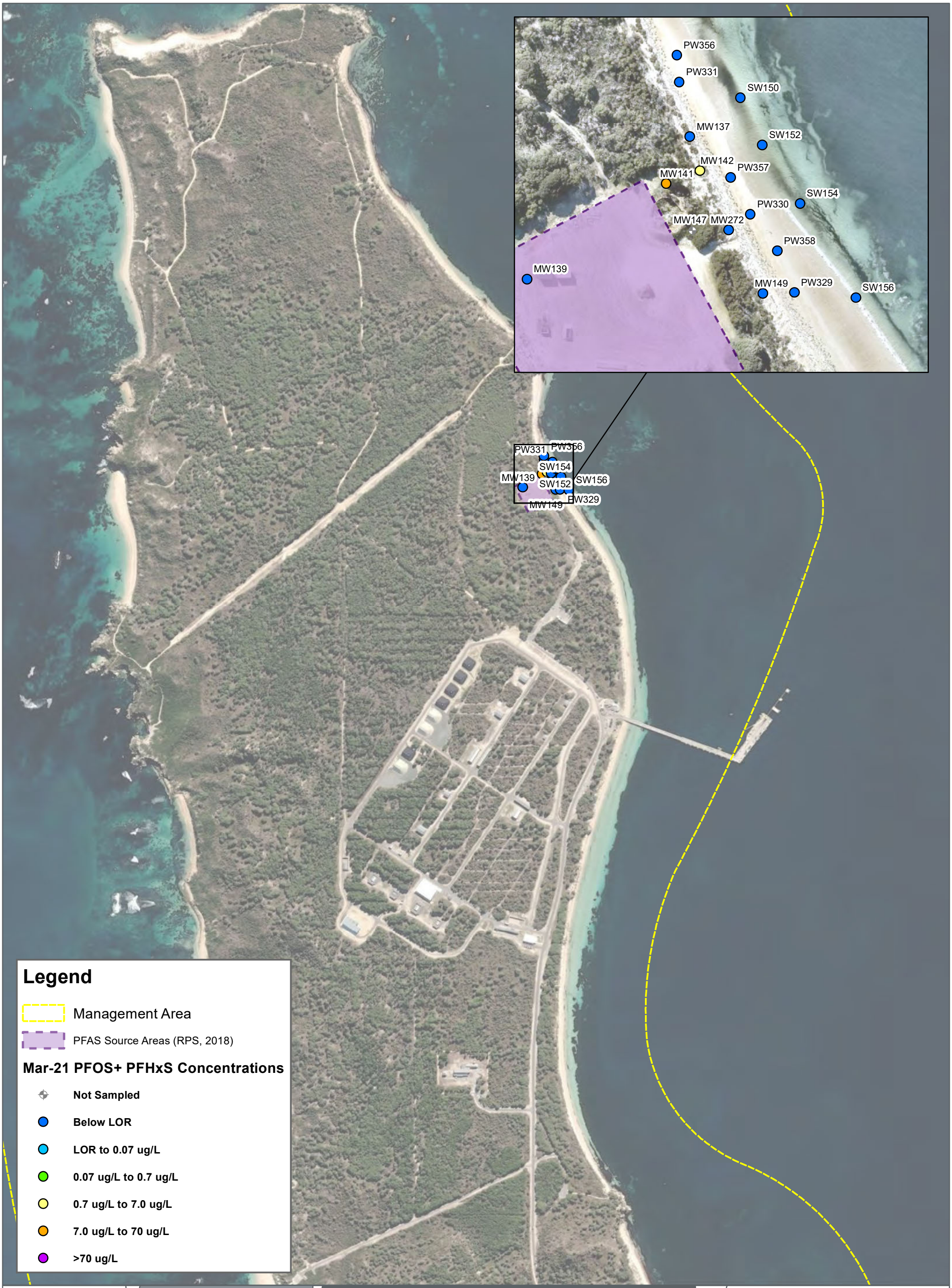
SW309
PW316
PW308
SW310
SW311
SW416
PW415
PW314
PW315
SW309
PW306
PW316
SW310
PW307
PW308
SW311
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Dec-20 PFOS + PFHxS Concentrations
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
>70 ug/L
FIGURE 8C
1:10,000 Scale at A3
Meters
0
200
400
PFOS+PFHxS Concentrations - December 2020
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
Cardno
Map Produced by Cardno WA
Date: 2022-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-008C_PFOS+PFHxS_Dec20 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap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SW152
MW142
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MW272
PW358
MW139
MW149
PW329
SW156
PW331
PW356
SW154
MW139
SW152
SW156
PW329
MW149
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Mar-21 PFOS+ PFHxS Concentrations
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
>70 ug/L
FIGURE 9A
1:10,000 Scale at A3
Meters
0
200
400
PFOS+PFHxS Concentrations - March 2021
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
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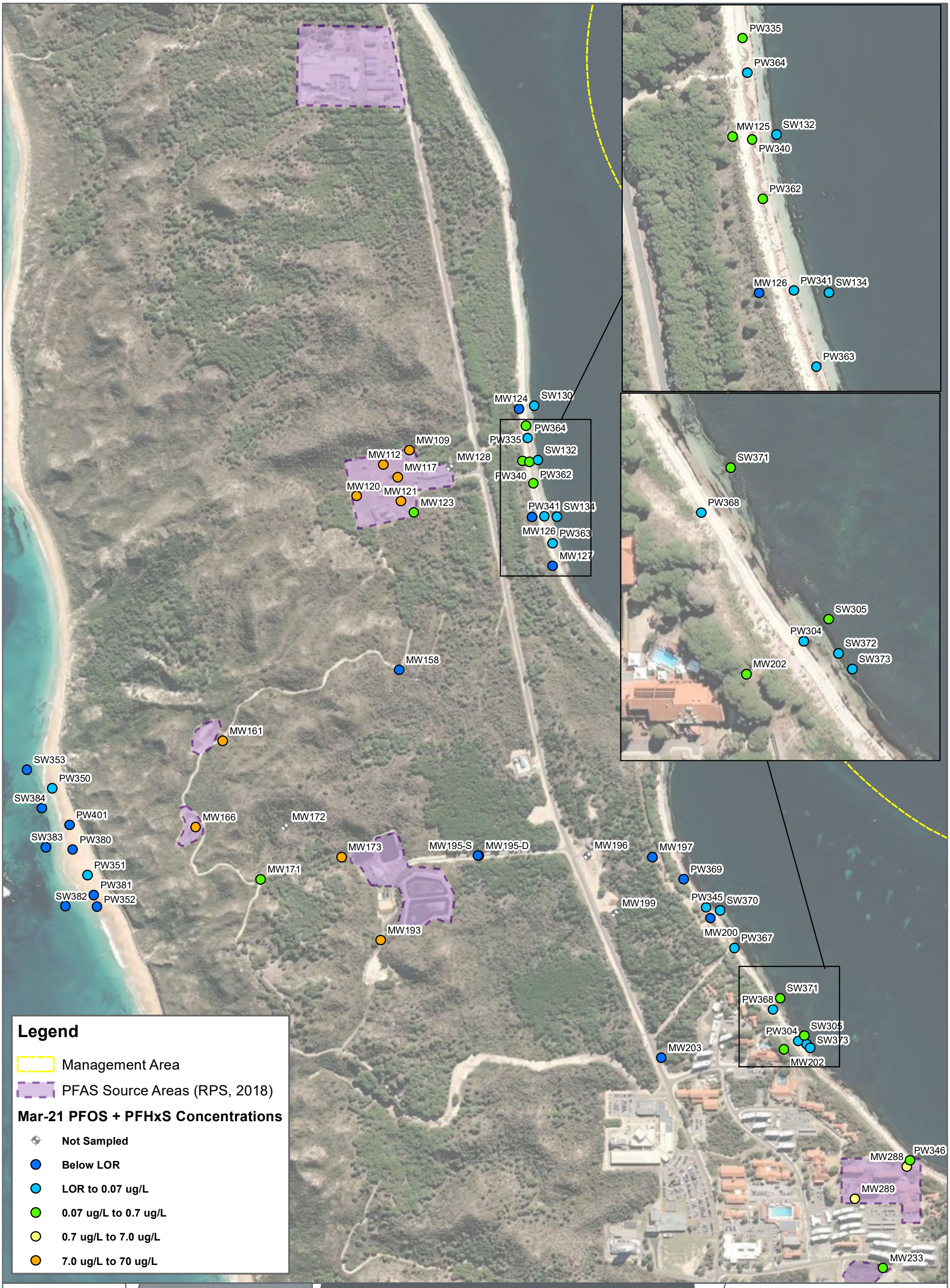
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-009A_PFOS+PFHxS_Mar21 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap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SW373
MW202
MW124
SW130
PW364
PW335
SW132
PW340
PW362
PW341
SW134
MW126
PW363
MW127
MW109
MW112
MW128
MW117
MW120
MW121
MW123
MW158
MW161
SW353
PW350
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MW195-S
MW195-D
MW196
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PW345
SW370
MW193
MW200
PW367
SW371
PW368
PW304
SW305
SW373
MW203
MW202
MW288
PW346
MW289
MW233
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Mar-21 PFOS + PFHxS Concentrations
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
FIGURE 9B
1:8,000 Scale at A3
Meters
0
200
PFOS+PFHxS Concentrations - March 2021
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
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Cardno
Map Produced by Cardno WA
Date: 2022-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
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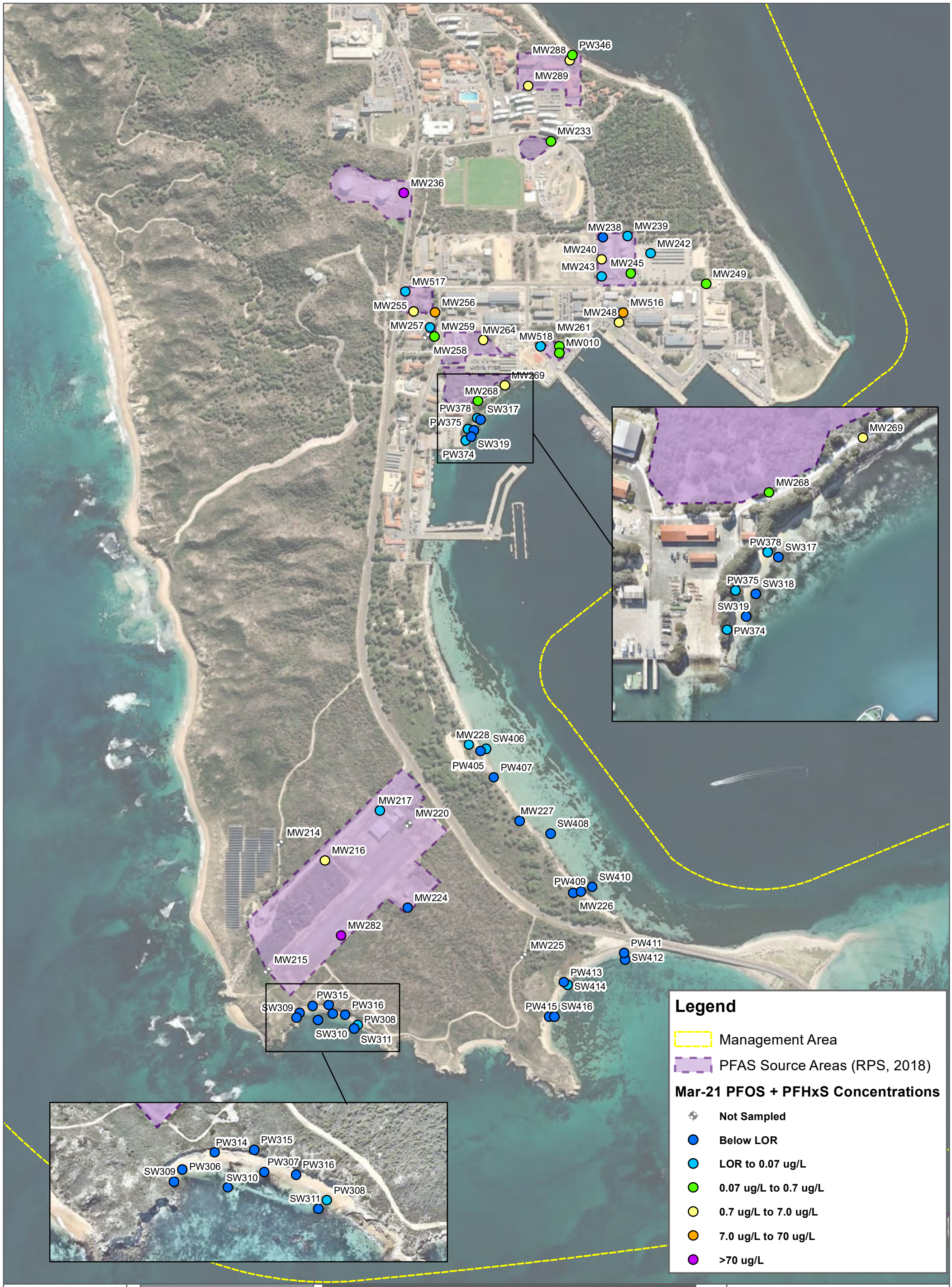
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MW248
MW257
MW259
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MW261
MW518
MW010
MW258
MW269
MW268
PW378
SW317
PW375
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PW374
MW269
MW268
PW378
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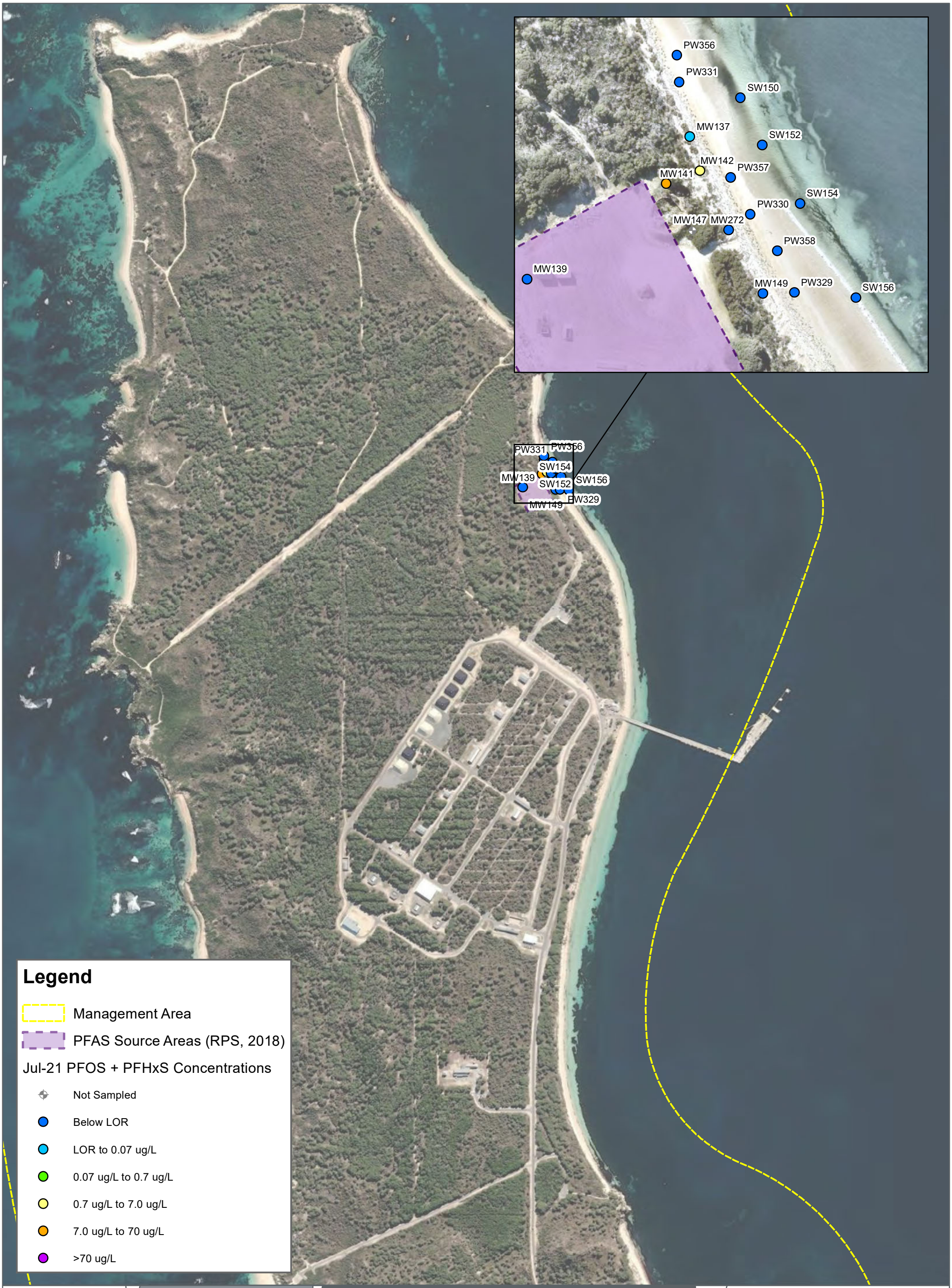
SW309
PW316
PW308
SW310
SW311
PW415
SW416
PW314
PW315
SW309
PW306
PW307
PW316
SW310
PW308
SW311
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Mar-21 PFOS + PFHxS Concentrations
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
>70 ug/L
FIGURE 9C
1:10,000Scale at A3
Meters
0
200
400
PFOS+PFHxS Concentrations - March 2021
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
Cardno
Map Produced by Cardno WA
Date: 2022-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-009C_PFOS+PFHxS_Mar 21 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap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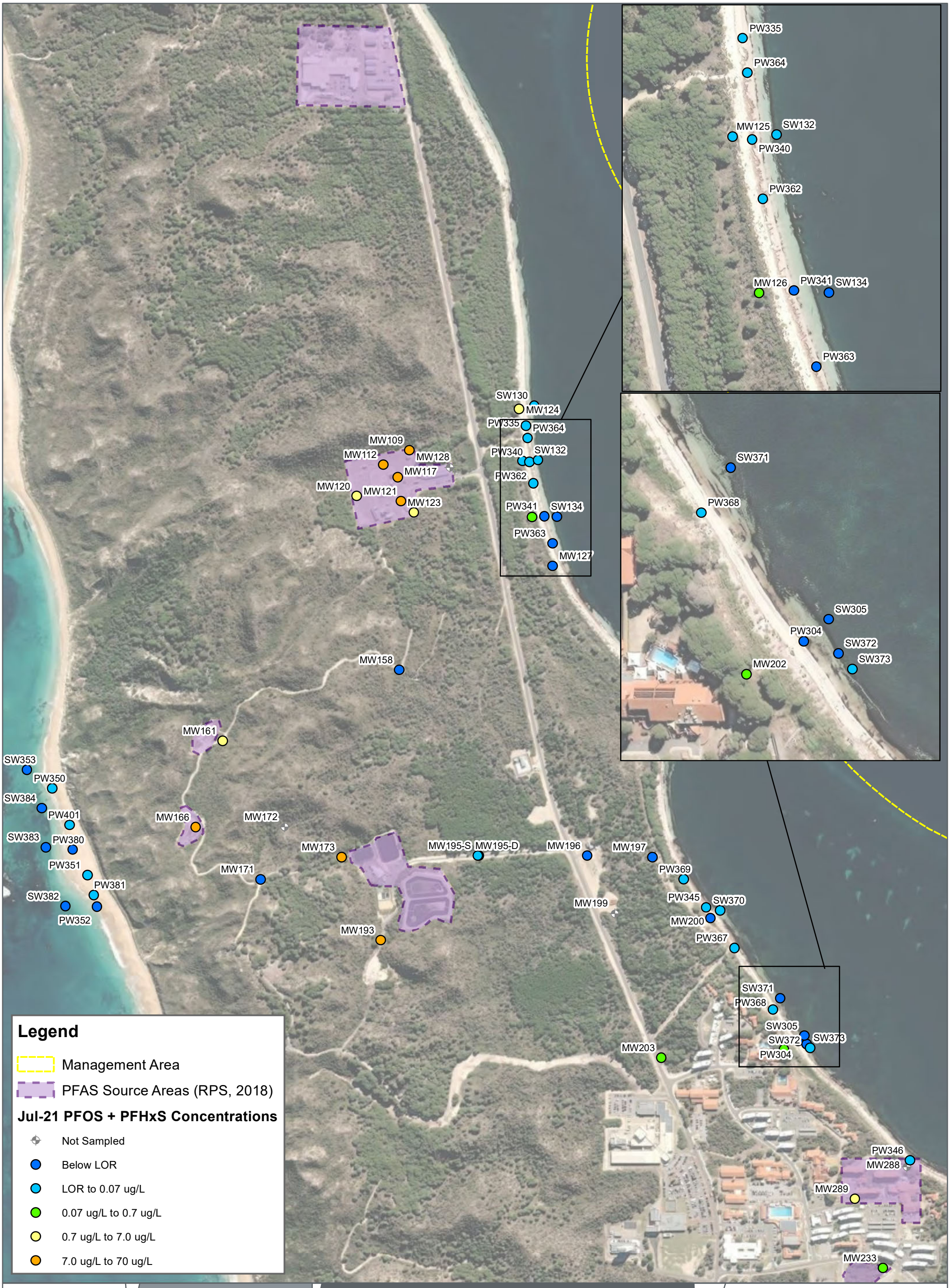
SW156
PW331
PW356
SW154
MW139
SW152
SW156
PW329
MW149
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Jul-21 PFOS + PFHxS Concentrations
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
>70 ug/L
FIGURE 10A
1:10,000 Scale at A3
Meters
0
200
400
PFOS+PFHxS Concentrations - July 2021
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2022-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-010A_PFOS+PFHxS_Jul21 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap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MW123
MW127
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PW368
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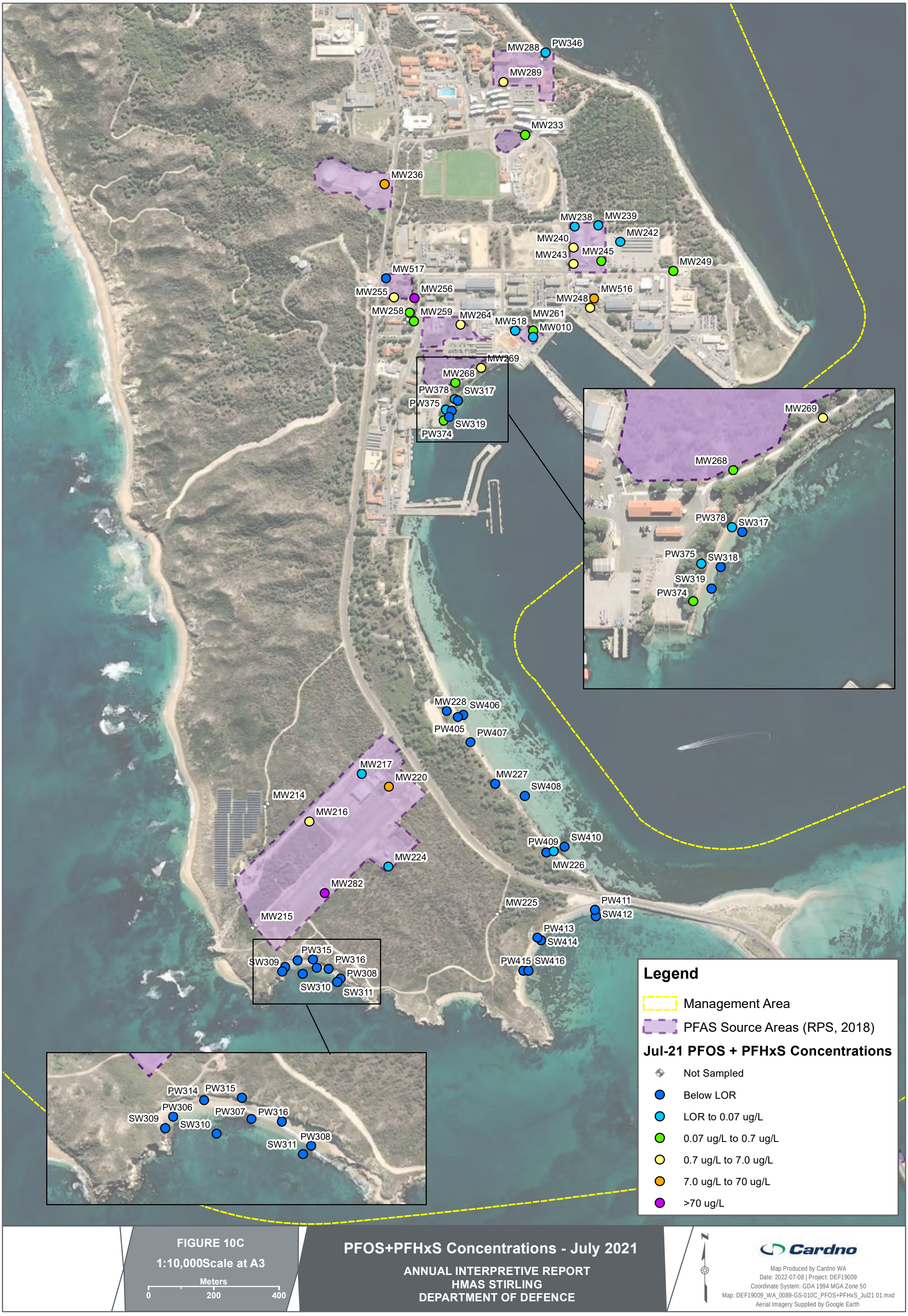
PW304
SW372
SW373
MW202
MW158
MW161
SW353
PW350
SW384
PW401
MW166
MW172
SW383
PW380
MW173
MW195-S
MW195-D
MW196
MW197
PW351
MW171
PW381
PW369
SW382
PW352
MW193
MW199
PW345
SW370
MW200
PW367
MW203
PW346
MW288
MW289
MW233
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Jul-21 PFOS + PFHxS Concentrations
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
FIGURE 10B
1:8,000 Scale at A3
Meters
0
200
400
PFOS+PFHxS Concentrations - July 2021
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2022-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-010B_PFOS+PFHxS_Jul21 01.mxd
Aerial Imagery Supplied by Google Earth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MW233
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MW238
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MW518
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PW308
SW310
SW311
PW415
SW416
PW314
PW315
PW306
PW307
PW316
SW309
SW310
PW308
SW311
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Jul-21 PFOS + PFHxS Concentrations
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
>70 ug/L
FIGURE 10C
1:10,000Scale at A3
Meters
0
200
400
PFOS+PFHxS Concentrations - July 2021
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HMAS STIRLING
DEPARTMENT OF DEFENCE
Cardno
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Map: DEF19009_WA_0089-GS-010C_PFOS+PFHxS_Jul21 01.mxd
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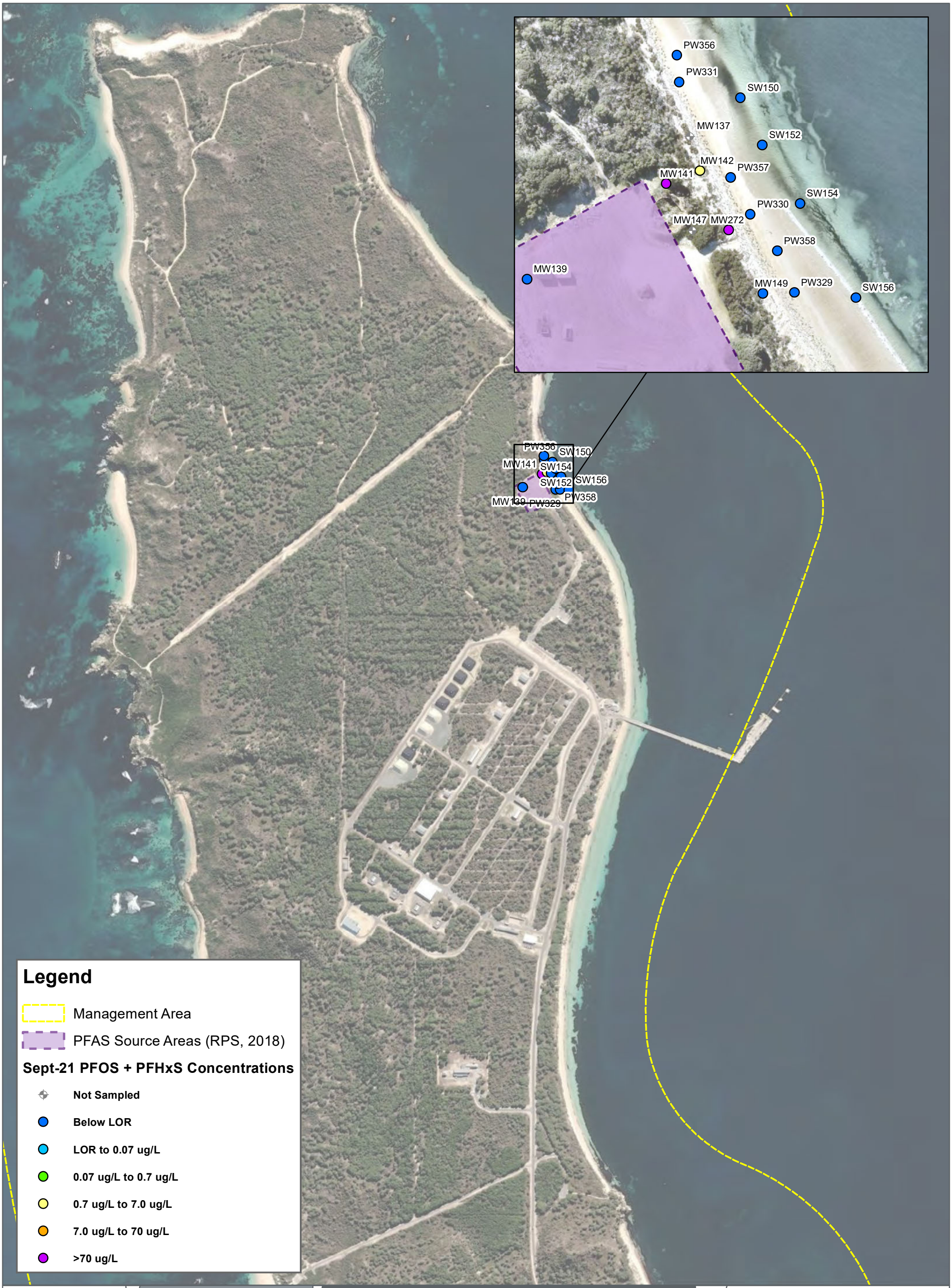
PW356
PW331
SW150
MW137
SW152
MW142
PW357
MW141
SW154
PW330
MW147
MW272
PW358
MW139
MW149
PW329
SW156
PW356
SW150
MW141
SW154
SW152
SW156
PW358
MW139
PW329
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Sept-21 PFOS + PFHxS Concentrations
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
>70 ug/L
FIGURE 11A
1:10,000 Scale at A3
Meters
0
200
400
PFOS+PFHxS Concentrations - September 2021
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
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Map: DEF19009_WA_0089-GS-011A_PFOS+PFHxS_Sept21 01.mxd
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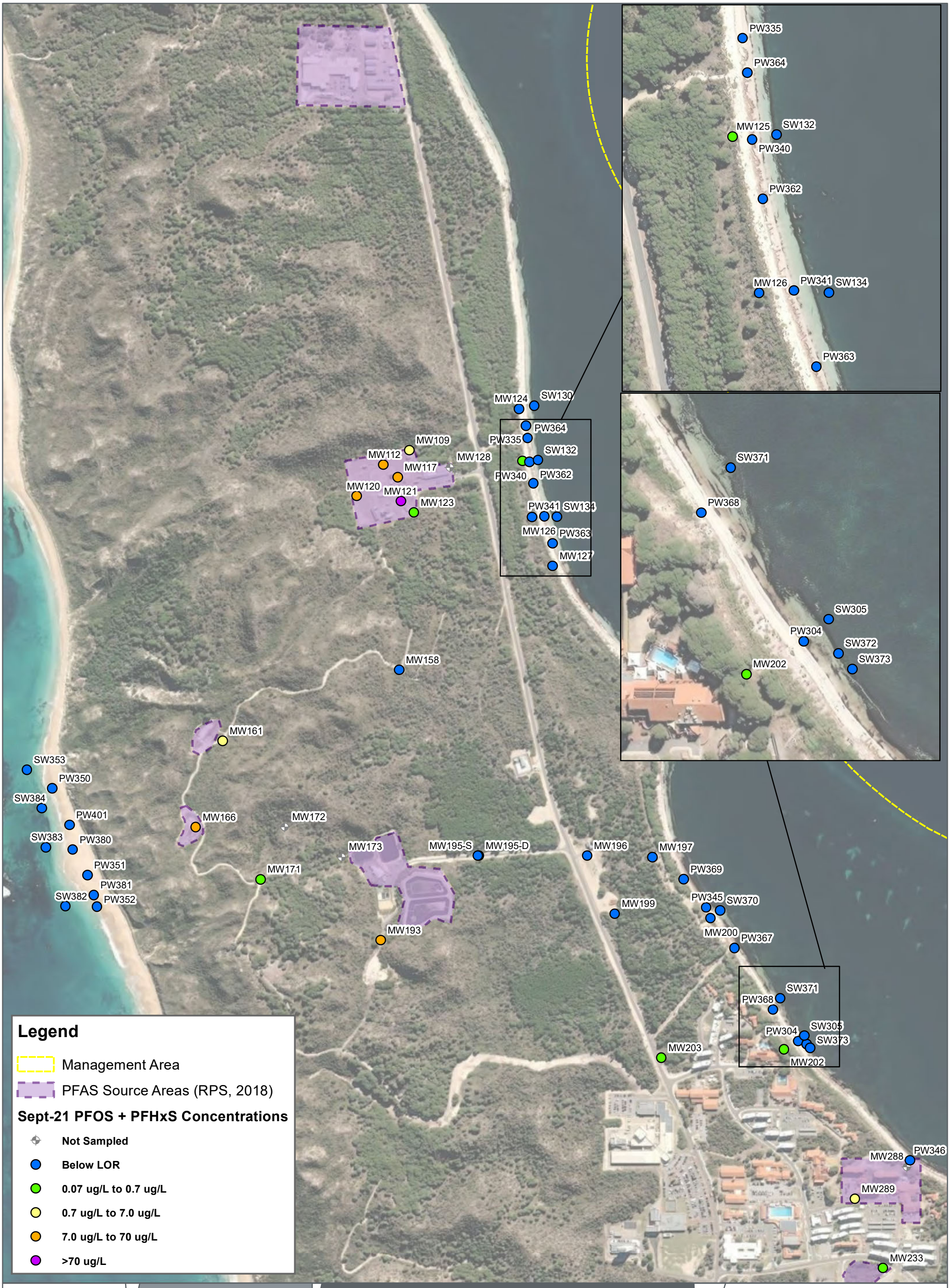
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PW364
MW125
SW132
PW340
PW362
MW126
PW341
SW134
PW363
SW371
PW368
SW305
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MW202
MW124
SW130
PW364
PW335
SW132
PW340
PW362
PW341
SW134
MW126
PW363
MW127
MW109
MW112
MW128
MW117
MW120
MW121
MW123
MW158
MW161
SW353
PW350
SW384
PW401
MW166
MW172
SW383
PW380
MW173
MW195-S
MW195-D
MW196
MW197
PW369
PW351
MW171
PW381
SW382
PW352
MW199
PW345
SW370
MW193
MW200
PW367
SW371
PW368
SW305
PW304
SW373
MW202
MW203
MW288
PW346
MW289
MW233
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Sept-21 PFOS + PFHxS Concentrations
Not Sampled
Below LOR
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
>70 ug/L
FIGURE 11B
1:8,000 Scale at A3
Meters
0
200
PFOS+PFHxS Concentrations - September 2021
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2022-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
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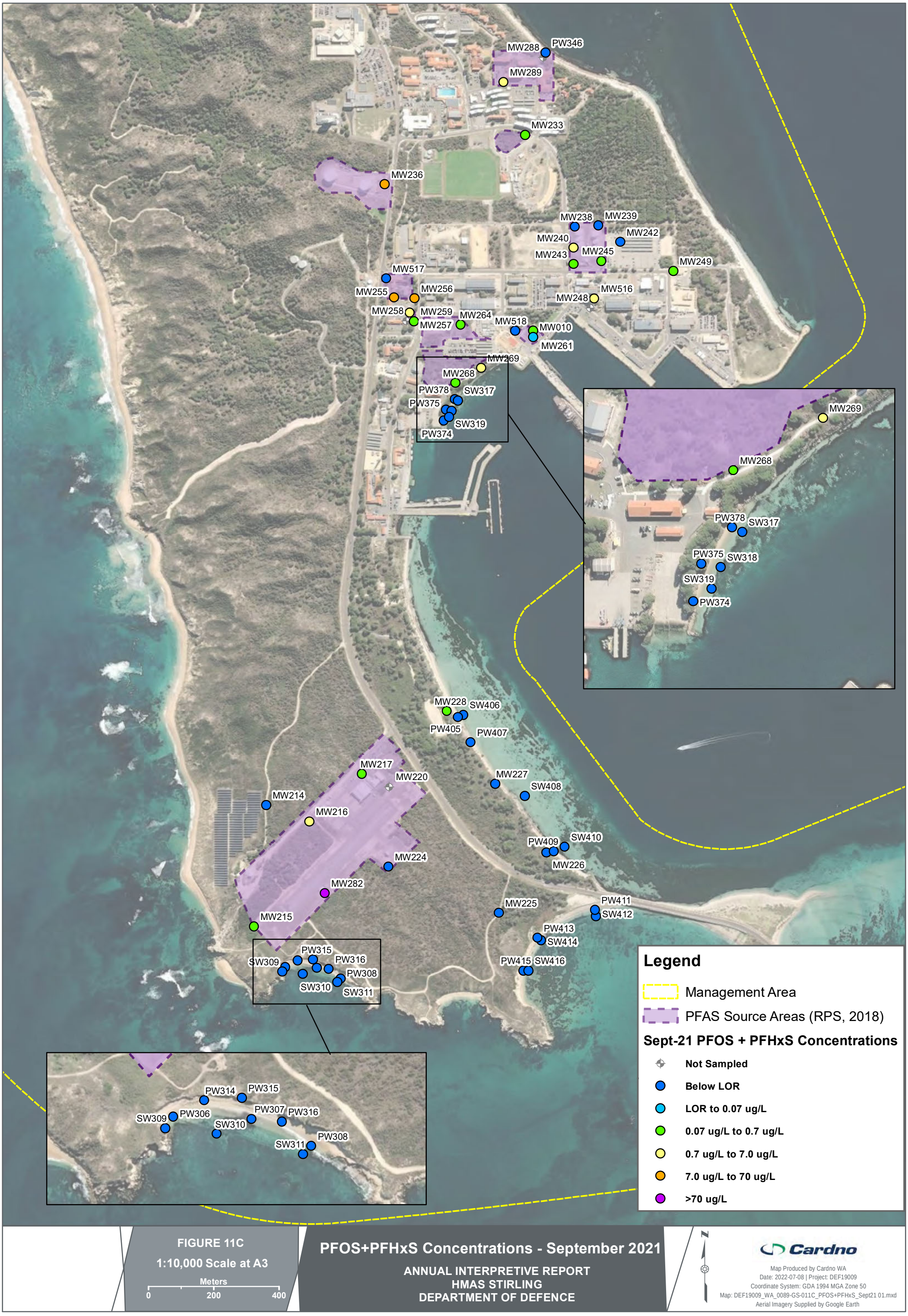
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PW346
MW289
MW233
MW236
MW238
MW239
MW242
MW240
MW245
MW243
MW249
MW517
MW255
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MW248
MW258
MW259
MW264
MW257
MW518
MW010
MW261
MW269
MW268
PW378
SW317
PW375
SW319
PW374
MW269
MW268
PW378
SW317
PW375
SW318
SW319
PW374
MW228
SW406
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PW407
MW217
MW220
MW227
SW408
MW214
MW216
PW409
SW410
MW224
MW226
MW282
MW225
PW411
SW412
MW215
PW413
SW414
PW315
SW309
PW316
PW308
SW310
SW311
PW415
SW416
PW314
PW315
SW309
PW306
PW307
PW316
SW310
PW308
SW311
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Sept-21 PFOS + PFHxS Concentrations
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
>70 ug/L
FIGURE 11C
1:10,000 Scale at A3
Meters
0
200
400
PFOS+PFHxS Concentrations - September 2021
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
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Map: DEF19009_WA_0089-GS-011C_PFOS+PFHxS_Sept21 01.mxd
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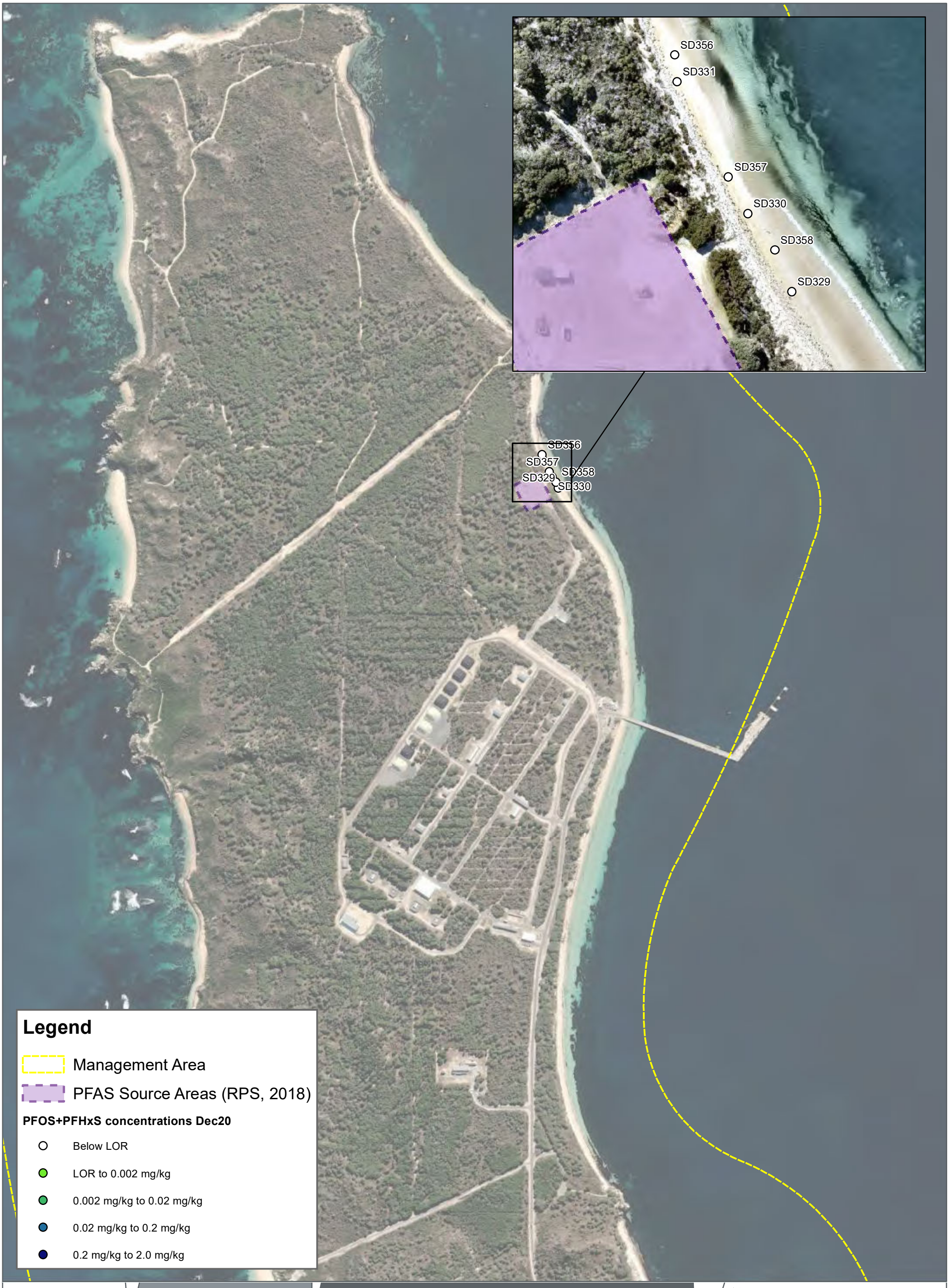
SD356
SD331
SD357
SD330
SD358
SD329
SD356
SD357
SD358
SD329
SD330
Legend
Management Area
PFAS Source Areas (RPS, 2018)
PFOS+PFHxS concentrations Dec20
Below LOR
LOR to 0.002 mg/kg
0.002 mg/kg to 0.02 mg/kg
0.02 mg/kg to 0.2 mg/kg
0.2 mg/kg to 2.0 mg/kg
FIGURE 12A
1:10,000 Scale at A3
Meters
0
200
400
Sediment Concentrations - December 2020
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2022-10-03 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-012A_SD-PFOS+PFHxS_Dec20 01.mxd
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FIGURE 12B

1:8,000 Scale at A3

Sediment Concentrations - December 2020

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Aerial Imagery Supplied by Google Earth

SD346

SD378
SD375
SD374

SD405
SD407

SD409

SD411

SD413

SD415

SD314 SD315
SD316
SD306 SD307
SD308

SD314
SD315
SD306
SD307
SD316
SD308

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

PFOS+PFHxS concentrations Dec20

- Below LOR
- LOR to 0.002 mg/kg
- 0.002 to 0.02
- 0.02 mg/kg to 0.2 mg/kg
- >0.2 mg/kg

FIGURE 12C

1:10,000 Scale at A3

Meters

0 200 400

Sediment Concentrations - December 2020

ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE

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Map Produced by Cardno WA
Date: 2022-10-03 | Project: DEF19009
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Map: DEF19009_WA_0089-GS-012C_SD-PFOS+PFHxS_Dec20 01.mxd
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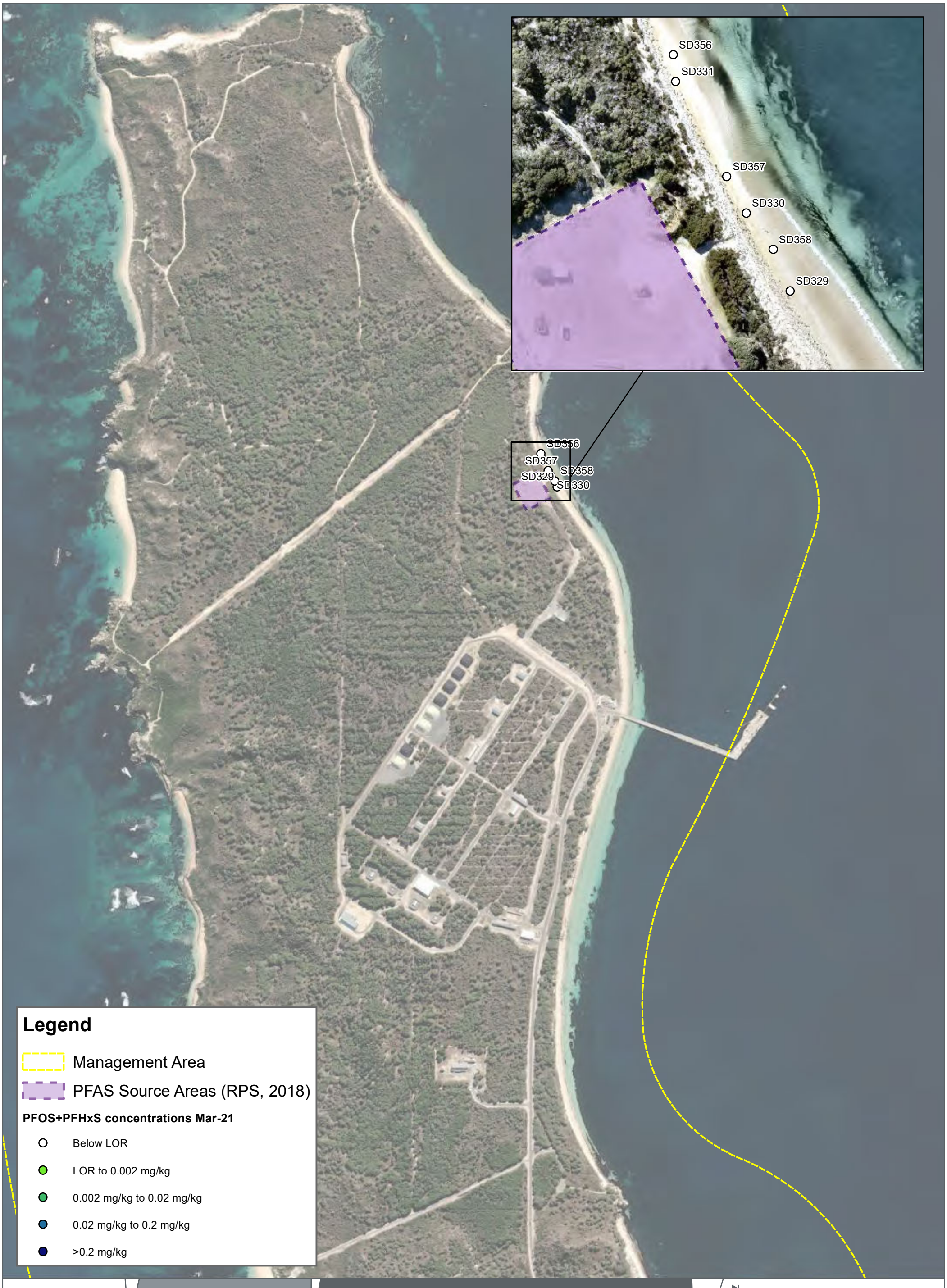
SD356
SD331
SD357
SD330
SD358
SD329
SD356
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SD330
Legend
Management Area
PFAS Source Areas (RPS, 2018)
PFOS+PFHxS concentrations Mar-21
Below LOR
LOR to 0.002 mg/kg
0.002 mg/kg to 0.02 mg/kg
0.02 mg/kg to 0.2 mg/kg
>0.2 mg/kg
FIGURE 13A
1:10,000 Scale at A3
Meters
0
200
400
Sediment Concentrations - March 2021
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2022-10-03 | Project: DEF19009
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SD335
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SD368
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SD350
SD401
SD380
SD351
SD381
SD352
SD369
SD345
SD367
SD346
Legend
Management Area
PFAS Source Areas (RPS, 2018)
PFOS+PFHxS concentrations Mar-21
Below LOR
LOR to 0.002 mg/kg
0.002 mg/kg to 0.02 mg/kg
0.02 mg/kg to 0.2 mg/kg
>0.2 mg/kg
FIGURE 13B
1:8,000 Scale at A3
Meters
0
200
400
Sediment Concentrations - March 2021
ANNUAL INTERPRETIVE REPORT
HMAS STIRLING
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N
Cardno
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Coordinate System: GDA 1994 MGA Zone 50
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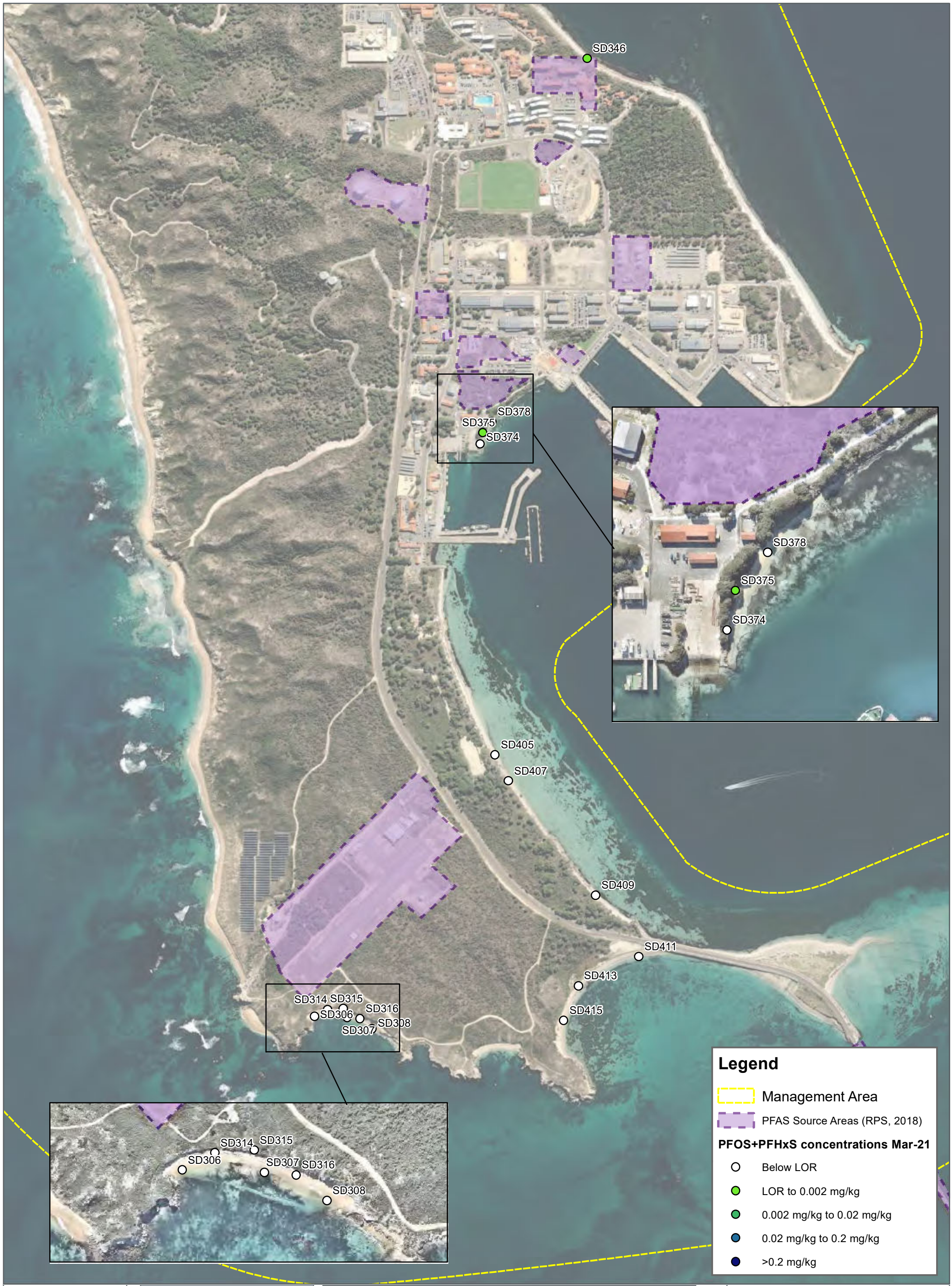

FIGURE 13C

1:10,000 Scale at A3

Meters

0 200 400

Sediment Concentrations - March 2021

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HMAS STIRLING
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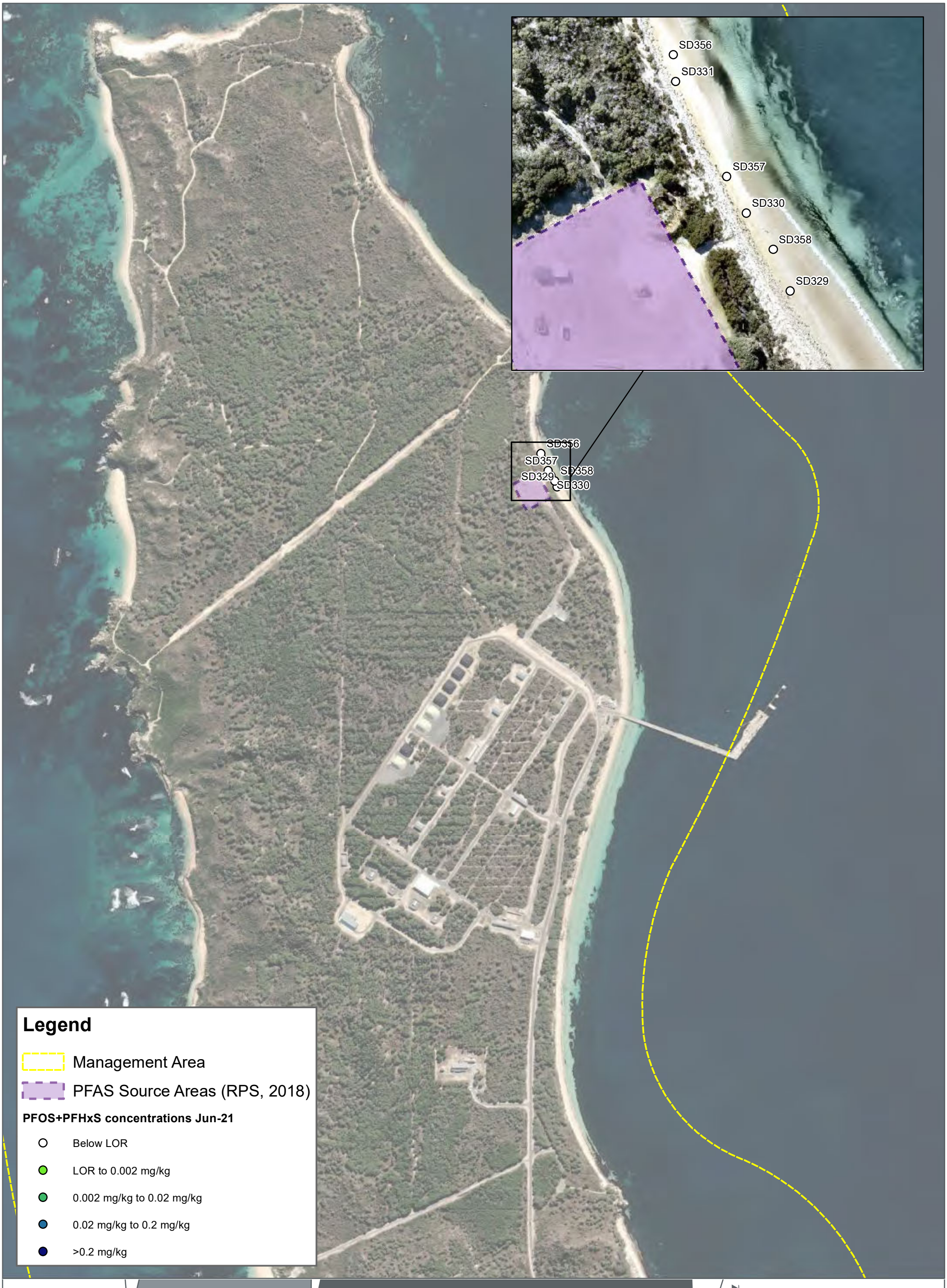
SD356
SD331
SD357
SD330
SD358
SD329
SD356
SD357
SD358
SD329
SD330
Legend
Management Area
PFAS Source Areas (RPS, 2018)
PFOS+PFHxS concentrations Jun-21
Below LOR
LOR to 0.002 mg/kg
0.002 mg/kg to 0.02 mg/kg
0.02 mg/kg to 0.2 mg/kg
>0.2 mg/kg
FIGURE 14A
1:10,000 Scale at A3
Meters
0
200
400
Sediment Concentrations - June 2021
ANNUAL INTERPRETIVE REPORT
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N
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FIGURE 14B

1:8,000 Scale at A3

Meters

0 200 400

Sediment Concentrations - June 2021

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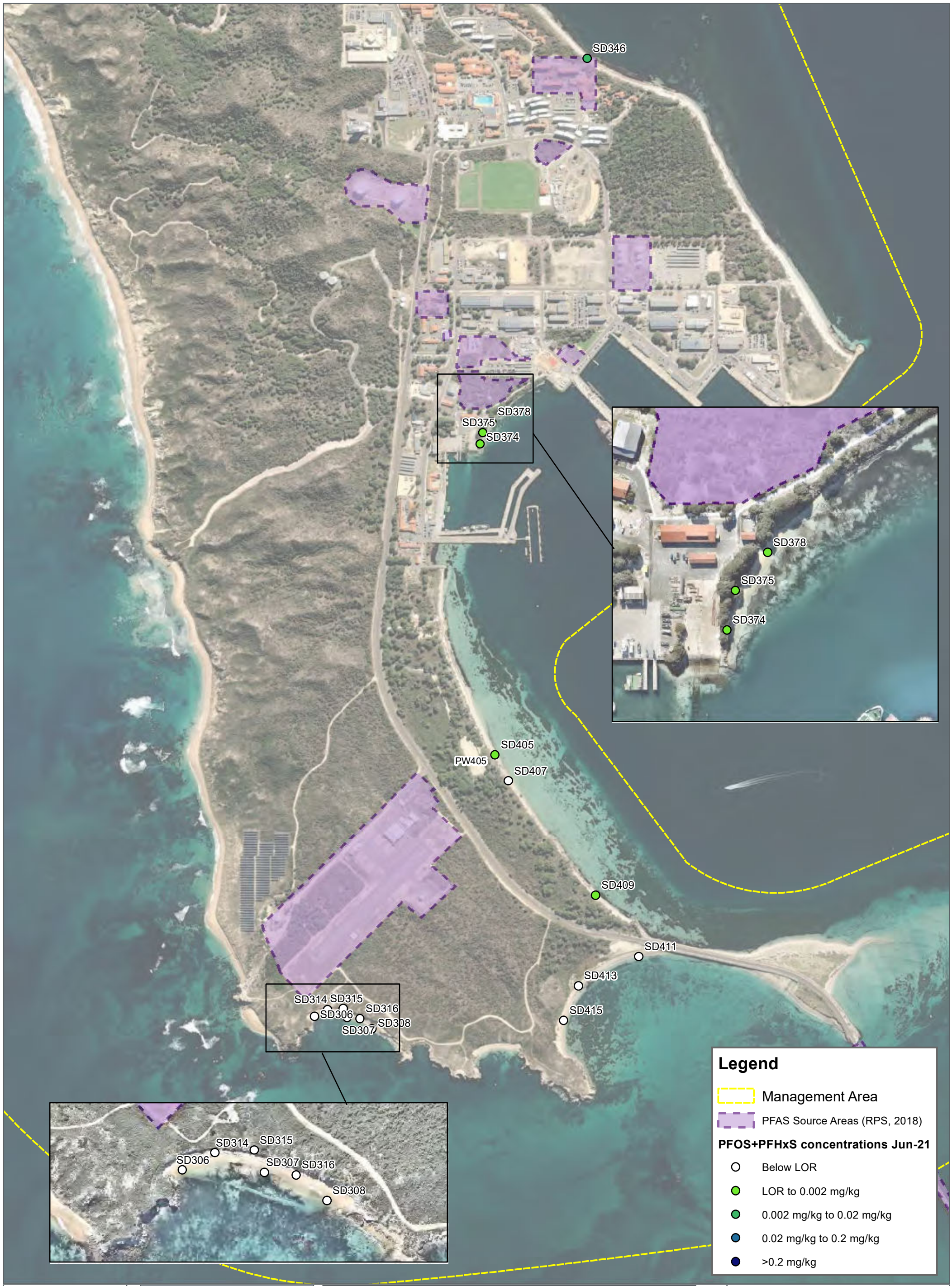

FIGURE 14C

1:10,000 Scale at A3

Meters

0 200 400

Sediment Concentrations - June 2021

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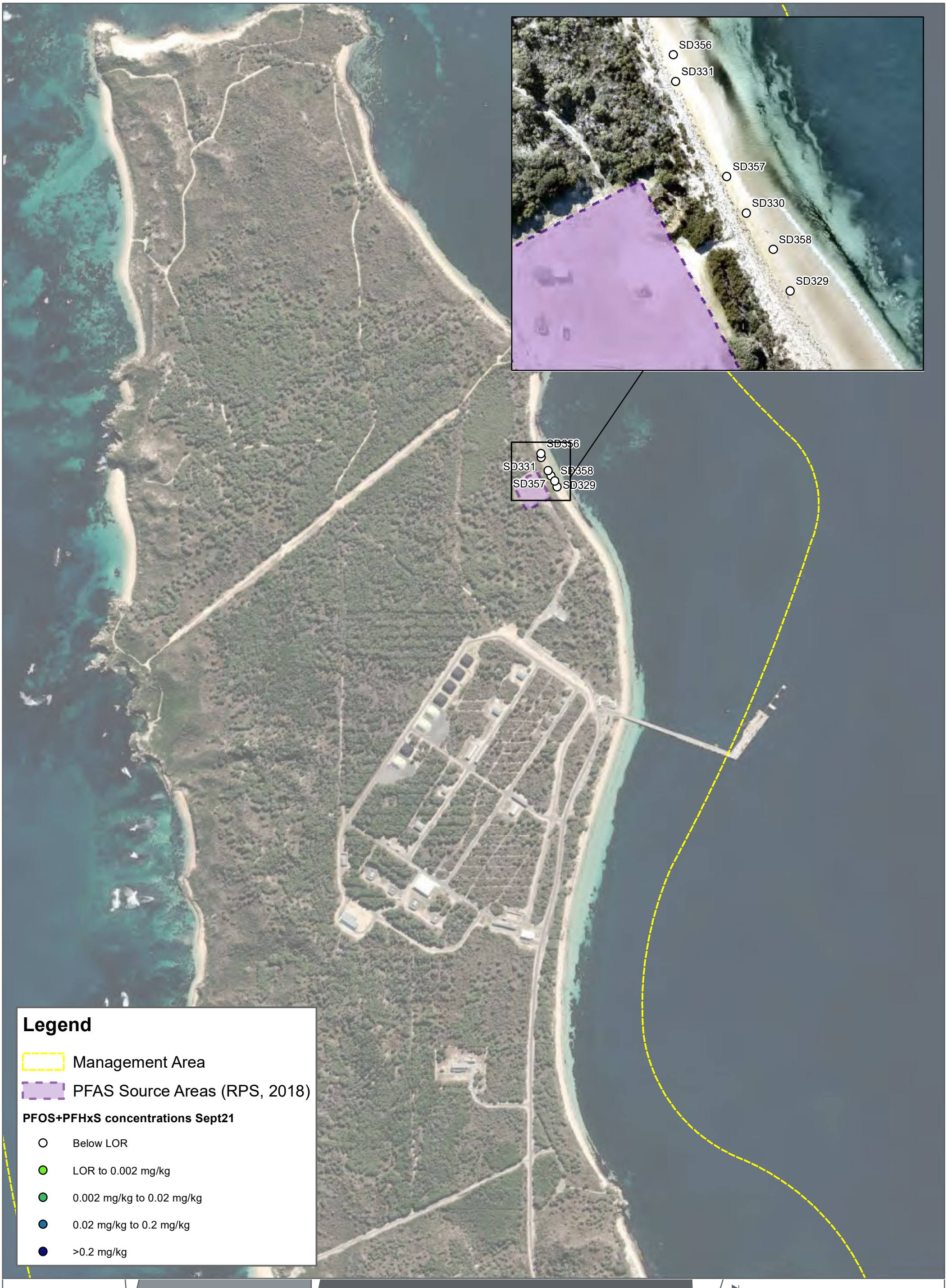
SD356
SD331
SD357
SD330
SD358
SD329
SD356
SD331
SD358
SD357
SD329
Legend
Management Area
PFAS Source Areas (RPS, 2018)
PFOS+PFHxS concentrations Sept21
Below LOR
LOR to 0.002 mg/kg
0.002 mg/kg to 0.02 mg/kg
0.02 mg/kg to 0.2 mg/kg
>0.2 mg/kg
FIGURE 15A
1:10,000 Scale at A3
Meters
0
200
400
Sediment Concentrations - September 2021
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FIGURE 15B

1:8,000 Scale at A3

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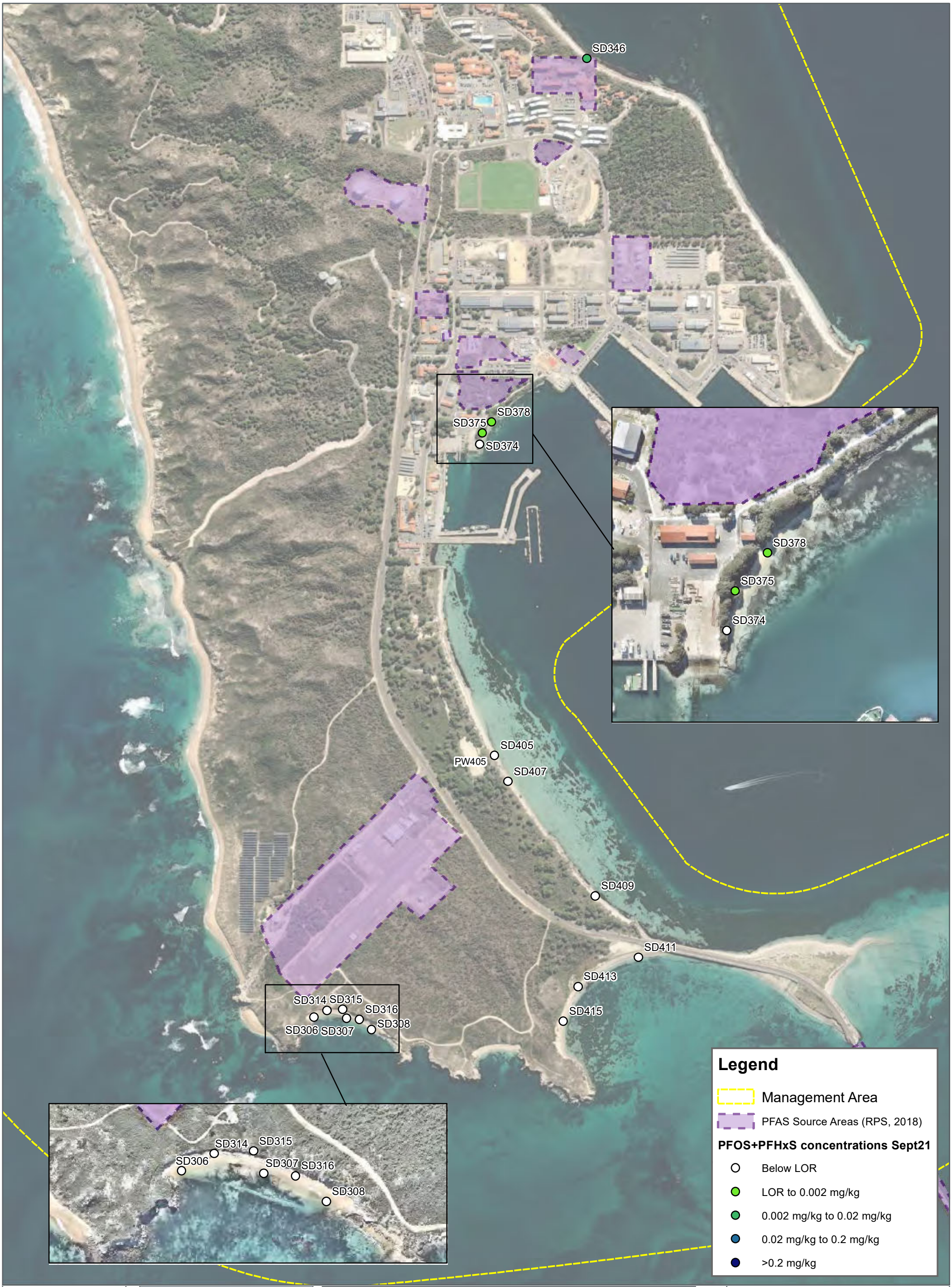

FIGURE 15C

1:10,000 Scale at A3

Meters

0 200 400

Sediment Concentrations - September 2021

ANNUAL INTERPRETIVE REPORT
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DEPARTMENT OF DEFENCE

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APPENDIX

B

SAQP

Cardno

now

Stantec

PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP)

HMAS Stirling

Prepared for

Department of Defence

March 2021

Cardno®

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Principal/Regional WA Project Manager

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Appendix A Figures

Appendix B Full PFAS Analytical Suite

1 Introduction

Cardno have been engaged by the Australian Department of Defence ('Defence' or 'Client') to prepare a Sampling and Analysis Quality Plan (SAQP) as part of the Ongoing Monitoring Plan (OMP), the purpose of which to monitor trends in the extent and concentrations of per- and poly-fluoroalkyl substances (PFAS) impacts identified on and around HMAS Stirling, located on Garden Island, 4 km off the Western Australian mainland, adjacent to the suburb of Rockingham (Figure 1, Appendix A).

The OMP SAQP applies to not only HMAS Stirling, but also the surrounding areas that, together with the Base, make up the "Management Area". For the purposes of this report:

> "the Site" was defined as HMAS Stirling Garden Island (Figure 1, Appendix A).

> "the Management Area" was defined as comprising Garden Island and the marine nearshore environment (Figure 2, Appendix A).

The Site is located on Commonwealth Land and is regulated under Commonwealth environmental legislation. The OMP outlines the rationale and scope for the monitoring of the concentrations and extent of PFAS in groundwater, surface water, porewater and sediment originating from the Site for an initial 24-months monitoring period. The 24-months monitoring period consists of quarterly sampling events in March, June, September and December.

1.1 Purpose & Objectives

The objective of the OMP SAQP is to present the specific monitoring locations, sampling methodologies and quality control / quality assurance measures for the monitoring of the concentrations and extent of PFAS in groundwater, surface water, porewater and sediment originating from the Site. These findings will inform risk management decisions by Defence and the Western Australian Government to protect human health and the environment.

The specific purposes of the monitoring specified in the OMP is to:

1. Evaluate change the nature and extent (spatial and temporal) of PFAS impact in groundwater, porewater and surface water pathways associated with Site sources of PFAS derived from AFFF;
2. Monitor the migration of PFAS in groundwater, porewater, sediment and surface water from the Site;
3. Provide confirmation of the current understanding of risk; and
4. Provide supporting data for assessment of management actions, where relevant.

1.2 Previous Reports

The following key reports prepared in relation to the HMAS Stirling PFAS Investigation have been used as a basis to develop this SAQP:

> Department of Defence, January 2019, HMAS Stirling Garden Island PFAS Management Area Plan, Final.

> RPS, October 2018, HMAS Stirling - PFAS Ongoing Monitoring Plan, Ref. EEC16094.005 (RPS, 2018a).

> RPS, May 2018, Detailed Site Investigation – HMAS Stirling PFAS Investigation, Ref. EEC16094.003 (RPS, 2018b).

> RPS, September 2018, HMAS Stirling Garden Island PFAS Investigation Ecological Risk Assessment. Ref. EEC16094.009 (RPS, 2018c).

> Cardno, 16 April 2020, PFAS OMP 2019 Q4 Quarterly Monitoring Factual Report, HMAS Stirling

> Cardno, 14 May 2020, PFAS OMP 2020 Q1 Quarterly Sampling Event Factual Report, HMAS Stirling

> Cardno, 23 September 2020, PFAS OMP 2020 Q2 Quarterly Sampling Event Factual Report

> Cardno, 8 January 2020, PFAS OMP 2020 Q3 Quarterly Sampling Event Factual Report

1.3 Responsible Parties

Responsible parties and responsibilities associated with the implementation of the OMP are detailed in Table 1-1.

Table 1-1 Responsible Parties

Role	Responsibilities
Department of Defence – PFAS Investigation and Management Branch	▪ Implement this OMP. ▪ Engage suitably qualified environmental consultants/contractors to carry out the works specified in the OMP
HMAS Stirling – Base Support Manager/ and Environment and Sustainability Manager	▪ Review and approve all necessary permits required for implementation of the works outlined in the OMP.
Environmental Consultant	▪ Obtain necessary permits from HMAS Stirling to implement the works outlined in the OMP. ▪ Undertake the monitoring activities outlined in this SAQP. ▪ Produce a monitoring report that summarises the data and findings of each monitoring event and is consistent with the requirements of this SAQP. ▪ Produce an annual interpretative report including recommendations for any potential changes in the location and frequency of sampling which may be incorporated in the revision of the OMP. ▪ Upload analytical data from each monitoring event to the relevant Defence ESdat database.

1.4 Relevant Guidelines

This SAQP has been prepared in general accordance with the WA *Contaminated Sites Act 2003* (CS Act), applicable industry standards and guidelines relevant to an assessment of this type, and has been formulated in reference to the following:

> National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013)* (ASC NEPM).

> Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, *PFAS National Environmental Management Plan 2.0 (NEMP)*.

> Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds*.

> Australian Standard AS 4482-1999 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 2 - Volatile substances*.

> Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling*.

> Australian and New Zealand Guidelines, 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*

> Department of Defence, Department of Energy, 2018, *Quality System Manual Schedule B15*.

> U.S. Environmental Protection Agency (EPA), 2000, '*Guidance for the Data Quality Objectives Process (EPA QA/G-4)*'.

> USEPA, 2002, '*Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.*

- Department of Environment and Regulation (DER), 2014, *Assessment and Management of Contaminated Sites*[1].
- National Health and Medical Research Council (NHMRC), August 2019, *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*.

1.5 Standards of Assessment and Limitations

This SAQP has been prepared in general accordance with the current industry standards for an assessment of this type for the purpose, objectives and scope identified in this report.

The scope presented in this SAQP report are derived only from available desk-based information and site inspection undertaken. This SAQP is not any of the following:

- A Mandatory Audit Report (MAR) or Voluntary Audit Report (VAR) as defined under the *Contaminated Sites Act 2003* (CS Act).
- A Geotechnical Assessment.
- A Detailed Site Investigation (DSI).
- A Detailed Hydrogeological Assessment.
- A Remediation Action Plan (RAP) or Site Remediation & Validation (SRV) report.
- A Site Management Plan (SMP).

2 Site Description and Management Areas

HMAS Stirling is located on Garden Island within Cockburn Sound, situated approximately 4 km off the WA mainland and connected to the mainland via a bridge in the south of the Island. The Island is 12 km long and 1.5 km wide at its widest point and covers an area of 1,274 hectares (ha).

Defence facilities occupy approximately 28% of the Island, with the majority focused around Careening Bay on the south east, with other support facilities located in other portions of the Island.

The Island is divided into eight administration areas:

- Causeway Sector
- Helicopter Support Sector
- Beagle Road Sector
- Careening Bay Sector
- Torpedo Maintenance Sector
- Fireground Sector
- RANAWED Sector
- Herring Bay Sector

The buildings and associated infrastructure and support services include:

- Accommodation blocks
- Helicopter Support Facility
- Fire Station

[1] It is noted that Site is located on Commonwealth Land and is regulated under the Commonwealth environmental legislation, the State based DWER guidelines are relevant for the sampling of off-Site nearshore marine environment.

- Fuel Farm
- Flammable / Hazardous goods and waste Storage
- AVCAT Storage Facility
- Waste Water Treatment Plant (WWTP)
- Seepage ponds
- Shipping berths and ship sullage area
- Maintenance and workshop areas
- Demolition ground
- Fire Training area

2.1 Site Definition and Planning

For the purposes of this SAQP report, “the Site” was defined as comprising HMAS Stirling Garden Island. A detailed description of the Site is provided in RPS’s DSI Report (RPS, 2018b). The site location is presented on Figure 1, Appendix A.

Key Site identification details are presented in Table 2-1.

Table 2-1 Site Identification Details

Details	Description
Site Address	Garden Island, WA
Land Description	HMAS Stirling
Owner	Commonwealth of Australia
Title Details	Lot 9 on Plan 226190
Planning Zone / Land use	Naval Development
Local Government Authority (LGA)	City of Rockingham

2.2 Surrounding Land Uses and Zoning

Cockburn Sound is used for a variety of activities both commercial and recreational including:

- Fishing
- Water sports
- Shipping

Kwinana Industrial Area is located immediately opposite Garden Island on the mainland side of Cockburn Sound. Activities occurring in the Kwinana Industrial Area include:

- Petroleum products
- Fertiliser production
- Chemical production
- Cement production
- Bulk material handling
- Metal refining
- Waste management
- Kwinana Power Station

3 Environmental Setting

Key details defining the site are summarised in Table 3-1.

Table 3-1 Key Site Details

Setting	Description
Climate	The Perth region, including Garden Island has a warm summer, cold winter Mediterranean climate. Mean maximum temperatures on the Island occur in February (28.3 ºC) while mean minimum temperatures occur in July (11.2 ºC). Rainfall is winter dominant, with the highest volume of rainfall typically occurring in July with a mean monthly rainfall amount of 115.5 mm.
Topography	Topography on Garden Island ranges from sea level, 0 meters relative to the Australian Height Datum (m AHD) along the eastern coast line to 55 mAHD within the middle of the Island. Steep dunes and limestone cliffs of up to 10 mAHD characterise the western perimeter of the Island, whilst the eastern perimeter is relatively flat.
Acid Sulfate Soil	A review of the Acid Sulfate Soils (ASS) risk mapping, available on the WA Atlas online database indicates no known risk of ASS occurrence within three meters of natural ground surface for the Site.
Hydrology	There are no natural surface water bodies on the Island, with any stormwater falling outside developed areas anticipated to infiltrate directly into the sandy soils and into the underlying superficial aquifer. Garden Island is surrounded by the Indian Ocean and the Cockburn Sound. Groundwater (and potentially PFAS) leakage between the superficial and deeper aquifers is unlikely at the northern half of Garden Island due to the presence of the Kardinya Shale confining unit. However, there is potential for groundwater and PFAS leakage between the superficial aquifer and underlying Rockingham Sand at the southern half of the Island where the Kardinya Shale is not present (RPS, 2018b).
Geology	**Regional Geology** Garden Island is an offshore outcrop of Tamala Limestone and part of the Garden Island Ridge, the WA Department of Mines and Petroleum 1:50,000 geological map series indicates the surface is Calcareous Sand (S2 and S13) (i.e. Safety Bay Sand – white medium grained rounded quartz and shell debris well sorted of eolian origin). **Site Specific Geology** Logs from the drilling of groundwater wells and soil cores during previous sampling programs (ENSR 2009, RPS 2018) indicate the geology of the Site varies with topography. The Demolition Ground in the north coast of the Island contains Safety Bay Sand to at least 5 meters below ground level (mbgl), and at the WWTP Safety Bay Sands were encountered down to 29 mbgl. Layers of limestone were encountered in certain areas (e.g. Fire Training Area at 1-2 mbgl and around the WWTP at 7-15 mbgl). Fill sands containing brick rubble and limestone cobbles were also encountered in the Fire Training Area to a depth of 1 mbgl.
Hydrogeology	▪ **Groundwater Occurrence** – The superficial aquifer at Garden Island, whilst geologically connected, is not hydraulically connected to the superficial aquifer of the mainland as both discharge to the near shore marine environment. The underlying confined aquifers, the Leederville and deeper Yarragadee, typically extend tens of kilometres offshore beneath the seabed and are thought to discharge terrestrial groundwater to the ocean several kilometres from the coast (Davidson, 1995). At the South of the Island the superficial aquifer extends to a depth of around 20 mbgl, with an aquitard (Kings Park Formation) at ~90 mbgl, overlying the Kardinya Shale around 140 mbgl, overlying the Leederville aquifer at ~165 mbgl. In the north of the Island, the Kardinya Shale is present at significantly shallower depth than in the south (~37 mbgl) and forms an aquitard to the deeper Leederville Formation at ~181 mbgl. ▪ **Depth to Groundwater** – The depth to groundwater is affected by the topography of the Island. Along the coast line groundwater is found at shallow depth (2-3 mbgl), whilst around the WWTP groundwater is up to 21 mbgl. The depth to groundwater, especially along the coastal fringes, will be influenced by tides within the surrounding marine environment.

Setting	Description
	▪ **Groundwater Flow Direction** – Regional groundwater flow direction are anticipated to be towards the marine environment, with flow on the east of the dunal system towards Cockburn Sound and flow towards the Indian Ocean on the west of the dunal system. Tidal pressure can influence localised flow direction in the vicinity of the coastline. **Salinity –** The superficial groundwater is classified as brackish by the DWER Perth Groundwater Atlas, with a total dissolved solids (TDS) in the range of 500 – 1,000 mg/L. ▪ **Groundwater Use** – Groundwater is not abstracted on the Island for potable or non-potable use. Potable water for Garden Island is supplied from the Rockingham town water supply. The DWER groundwater database found two registered abstraction bores (Leederville Aquifer) on the mainland within 20 km of Garden Island. These bores are used for irrigation and industry. RPS ruled out any risk of PFAS impact to these bores according to the calculated groundwater travel time (RPS, 2018b).
Environmental Sensitive Areas	Due to its significant natural and cultural heritage values, the Island is protected by the *Environment Protection and Biodiversity Act 1999* (EPBC Act). Several vulnerable species of flora have also been listed as endangered ecological communities. The vegetation on the Island is also included in Bush Forever Site 63, with the Bush Forever policy providing a framework for bushland protection and management issues in WA. Additionally, the seagrass meadows along the eastern margin of Garden Island are a significant remnant population of seagrass in Cockburn Sound and are protected under the *State Environmental (Cockburn Sound) Policy 2015*.
Further information can be found in the Consolidated DSI report (RPS, 2018b).	

4 Source Areas and Risk

The Site has been subject of previous PFAS investigations, including:

> Environmental Review of Fire Fighting Training and Facilities (AURECON, 2010)

> Environmental Investigation of AFFF Spill at Fleet Base West, Preliminary Site Investigation (AECOM, 2012)

> Defence Per- and Poly-fluoroalkyl Substances (PFAS) Environmental Management Preliminary Sampling Program (GHD, 2016)

> Stage 2 Detailed Site Investigation (Greencap, 2017)

> Sampling and Analysis Quality Plan HMAS Stirling – PFAS Investigation (RPS, 2017)

> Detailed Site Investigation – HMAS Stirling PFAS Investigation (RPS, 2018b)

> Ecological Risk assessment, HMAS Stirling – PFAS Investigation (RPS, 2018c).

4.1 Source Areas

Various PFAS source areas across the Island were identified resulting from historical AFFF use/storage. These locations are shown on Figure 2, Appendix A and include:

> Fire training area

> Helicopter support facility

> Demolition ground

> Waste water treatment plant (WWTP)

> AVCAT storage, fuel farm and infiltration swale

> Fire station

> Dredged sediments

- Ship sullage area
- Flammable/hazardous goods and waste storage
- Accommodation area.

The results of the DSI (RPS, 2018b) indicate that PFAS was identified in all assessed matrices (soil, groundwater, surface water, sediment and porewater) in at least one location on the Island.

5 Data Quality Objectives

Development of data quality objectives (DQOs) for the OMP SAQP is based on guidance presented in the ASC NEPM (NEPC 2013) and are consistent with the HMAS Stirling PFAS Ongoing Monitoring Plan (RPS, 2018b). The DQO process comprises the following seven steps:

- Step 1: State the problem
- Step 2: Identify the decision/principal study question(s)
- Step 3: Identify the Inputs into the Decision
- Step 4: Study Boundaries
- Step 5: Decision rules
- Step 6: Tolerable limits on decision errors
- Step 7: Optimisation of the data collection process

The DQOs are detailed in Table 5-1.

Table 5-1 Data Quality Objectives

Data Quality Step	Description
State the Problem	Sampling and analysis completed as part of the DSI (RPS, 2018b) and ERA (RPS, 2018c) conducted at the Site have identified concentrations of PFAS in soils, sediments, groundwater, surface water and porewater resulting from historical use of AFFF on Garden Island. The DSI and ERA confirmed that there is no significant risk from the identified PFAS concentrations to human health or ecological receptors. To confirm the current understanding of risk identified in DSI/ERA investigations, quarterly monitoring over a 24-months period is required which will provide confirmation of PFAS concentrations allowing for seasonal variability. **Groundwater** ▪ PFAS were detected above the LOR within all wells at the fire training area, the WWTP and the demolition ground (RPS, 2018b) with exceedances of adopted guidelines observed. ▪ Exceedances of the guidelines adopted to be protective of human health were observed in groundwater. The human health risk is generally considered to be low in regards to the groundwater uses however, there remains a potential risk to maintenance/construction workers. **Surface Water** ▪ Surface water concentrations are above adopted guidelines along the coastline, at the Demolition Ground, WWTP, and Helicopter Support Facility and as such may pose a risk to marine ecological receptors. ▪ Although recreational fishing and shell fishing may be undertaken on a limited basis around the Island, there is limited potential for dietary ingestion of PFAS to be a significant pathway due to the low levels of PFAS detected in marine sediment and surface water. **Sediment and Porewater** ▪ Soils at the Fire Training Area, Helicopter Support Facility and Fire Station pose a risk to the local ecology via direct contact to organisms, plant and fauna. The risk posed by soils to the local marine ecology was considered to be low.

Data Quality Step	Description
	▪ Sediments at the Fire Station were found to contain PFOS above the adopted assessment levels which may act as a source for the migration of PFAS to groundwater and the subsequent lateral migration to marine sediments, porewater and surface waters. ▪ Whilst there are no current pore water guidelines, concentrations within pore water were above adopted groundwater and surface water guidelines at the demolition ground, WWTP and dredged sediment areas. Groundwater may transport PFAS into coastal marine environments where it mixes with the sediments pore water. PFAS concentrations in pore water above adopted ecological guidelines pose a risk from bioaccumulation and biomagnification. Most of the sampling locations (groundwater, surface water, and sediment sampled as part of the DSI) have only been tested once or twice (i.e. limited time series/seasonal data). A robust dataset is required to assess trends in the nature, extent and magnitude of PFAS concentrations within sediment, surface water and groundwater to validate/improve the understanding of the CSM in relation to spatial and temporal variability of PFAS concentrations within the Management Area and associated receptors.
Identify the decision/principal study question(s)	This OMP is to provide further data to assess the following principal study questions: ▪ What are the changes and trends in the nature, extent and magnitude of PFAS concentrations in the groundwater, surface water and sediment within the Management Area? ▪ Has the nature, extent and magnitude of PFAS concentrations changed significantly to warrant a revision of the ERA? ▪ Has the nature, extent and magnitude of PFAS concentrations changed significantly to warrant refinement of any existing management measures? ▪ Has the nature, extent and magnitude of PFAS concentrations changed significantly or are they likely to change?
Identify the Inputs into the Decision	The following inputs are required to resolve the principal study questions outlined in Step 2: ▪ PFAS concentrations in groundwater, surface water, porewater and sediment from previous and future monitoring events. ▪ Field data (i.e. groundwater levels, physico-chemical parameters) on groundwater, porewater and surface water from previous and future monitoring events. ▪ An appropriate statistical evaluation of the data (e.g. using Mann-Kendall or similar analysis) including short- and long-term trends, in particular for surface water and groundwater concentrations. ▪ Comparison of data sets to relevant endorsed assessment levels (refer to Section 7).
Study Boundaries	Ongoing monitoring will be undertaken within the boundaries of the Management Area (Figure 2, Appendix A) at the groundwater, surface water, porewater and sediment monitoring locations outlined in Sections 6.3.1 and 6.4.1. Monitoring will be undertaken every three months, with one monitoring event in March, June, September and December. Section 6 provides further detail on the monitoring frequency.
Develop a Decision Rule	▪ The analytical and field data will be used to assess changes to the nature, extent and magnitude of PFAS in surface water, sediment and groundwater and to provide supporting data for assessment of management actions, where relevant. ▪ Trends in PFAS concentrations, including an assessment of temporal and spatial changes, will be assessed using an appropriate statistical analysis approach (e.g. using Mann- Kendall, GWSdat or similar analysis), with a specified level of confidence based upon the number of monitoring rounds completed. ▪ The analytical data will be compared to the relevant assessment levels (presented in Section 7) and/or historic concentrations (i.e. maximum concentration) recorded during prior monitoring rounds [i.e. during the DSI (RPS, 2018b)] to evaluate changes in the risk profile and whether revision of the OMP, ERA or implemented management measures is warranted. Where exceedances of adopted assessment criteria levels (presented in Section 7) or new detections are reported, further interrogation of data will be undertaken to the

Data Quality Step	Description
	extent relevant to assess the risk profile and location. A summary of the key decision rules as detailed below: 1. Have the analytical data collected as part of the monitoring program met the DQI (refer Table 5-2.below)? If yes, then the data can be used to answer the decision rule below and the decision statements developed in Step 2. If no, then an assessment of the need to collect additional data will be required. 2. Do PFAS concentrations exceed the investigation criteria? If no, then the contamination would be considered not to pose an unacceptable risk. Where results exceed the adopted investigation criteria, this may not necessarily indicate an unacceptable level of risk. Further risk assessment, and potentially additional investigations, will be required to determine the potential for unacceptable impacts. 3. Has PFAS been detected in any bores previously not detected? If yes, do PFAS concentrations reported indicate an increasing trend and/or exceed historic maximum concentrations? Do results indicate a potential risk to associated receptors including associated risks that PFAS may present towards receptors (i.e. human and ecological). Further risk assessment, and potentially additional investigations, will be required to determine the potential for unacceptable impacts. 4. Has PFAS been detected in offsite surface water bodies within the management areas? If yes, do PFAS concentrations reported indicate an increasing trend or exceed historic maximum concentrations? Do results indicate a potential risk to receptors and changes to the risk profile? Further risk assessment, and potentially additional investigations, will be required to determine the potential for unacceptable impacts. Annual Interpretative Report will review the results obtained against these triggers/decisions.
Specify Limits on Decision Error	The potential for significant decision errors will be minimised by completing a robust QA/QC program in accordance with DWER and NEPM guideline requirements. Standard operating procedures will be closely followed in the field to ensure accurate and representative data acquisition. DQIs will be applied to assess usability of data prior to making decisions, based on precision, accuracy, representativeness, comparability and completeness. The acceptable limit on decision error is 95% compliance with the applied DQIs (see Table 5-2). If any of the DQIs are not met, further assessment will be necessary to evaluate the significance of the non- conformance and any corrective actions.
Optimise the Design for Obtaining the Data	The design of the OMP has been made in consideration of historical activities at the site, historical investigations (and findings i.e. DSI and ERA), in the context of developing responses to the principal study questions outlined in Step 2 and to meet the DQOs ensuring that a representation of the current site condition can be achieved. The OMP scope for the 24 months of monitoring is outlined in Section 6. Following initial implementation (and review following each monitoring event), the available data will be reviewed and evaluated to determine if the frequency of monitoring should increase or decrease to provide better understanding of PFAS concentration fluctuations and potential risks to receptors. As additional information is gathered during the course of this investigation/monitoring, it may be beneficial for the proposed scope of works to be altered from the initial design. Changes to the proposed monitoring, if considered necessary, will be made based on risk profile reviews and updated CSM and in consultation with the Client Other factors that will optimise the design for obtaining data will include the use of laboratories that are NATA accredited for PFAS analysis and ensure laboratory LORs are suitable to meet the relevant adopted assessment levels (where possible), experienced field scientist(s), robust field and laboratory quality assurance/quality control protocols are adopted and Field and analytical data are collected in accordance with the PFAS NEMP (HEPA 2020), ASC NEPM (NEPC 2013) and the assessment of contaminated sites (DER 2014).

An assessment of the Data Quality Indicators (DQIs) relating to both field and laboratory procedures will be undertaken with appropriate documentation provided for each environmental element or media assessed. The DQIs adopted for the DSI are summarised in Table 5-2.

Table 5-2 Data Quality Indicators

<table>
<tr><th>Data Quality Indicator</th><th>Detail</th></tr>
<tr><td>QA Documentation</td><td>Provision of appropriate work plans, DQI and DQO defined for the site and all QA/QC aspects documented.</td></tr>
<tr><td>Bias</td><td>A measure of the potential distortion in an analysis which can result in errors in one direction (e.g. one laboratory consistently higher results or consistent poor spiked matrix recovery).
Bias will be assessed with reference to the analysis of spiked matrix samples (NEPC 1999b).</td></tr>
<tr><td>Representativeness</td><td>A qualitative measure of the confidence that data is representative of each medium present on the site. Use of appropriate and documented sampling methods, sampling handling, preservation and transport and holding times.</td></tr>
<tr><td>Precision:</td><td>A quantitative measure of data variability or reproducibility, measured by the calculation of %RPD values for duplicate samples (i.e. measure of agreement).
Precision in DQI is considered an important assessment in an environmental study (USEPA, 2002, Guidance on Environmental Data Verification and Data Validation). It can be measured as follows:
▪ Percentage of the mean of the measurement such as Relative Percent Difference (i.e. %RPD). The %RPD will be calculated for the field and secondary duplicate (i.e. inter and intra-laboratory analysis); and
▪ Use of similar analytical method and instrument (e.g. for inter-laboratory assessment).
The %RPD will be considered as acceptable if the values are:
<table>
<tr><th>Magnitude of result</th><th>Acceptable RPD range</th></tr>
<tr><td><10 x limited of reporting (LOR)</td><td>No limits</td></tr>
<tr><td>10 – 20 x LOR</td><td>0% - 50%</td></tr>
<tr><td>>20 x LOR</td><td>0% - 20%</td></tr>
</table>
▪ Should there be a result that is greater than acceptable RPD range, then a “review should be conducted of the cause (e.g. instrument calibration, appropriateness of method used)” (NEPC, 2013).
For the purpose of this OMP, field and secondary duplicates should be collected at a rate of 1 in 10 samples (HEPA 2020 and RPS, 2018c).</td></tr>
<tr><td>Accuracy</td><td>A quantitative measure of the closeness of data to a ‘true value’, measured by the analysis of spike, blank and laboratory control samples (LCS). The LCS consists of a standard reference material or a matrix of known concentration.
For the purpose of assessing accuracy it is required that at least one LCS for each process batch be analysed (NEPC, 2013).</td></tr>
<tr><td>Comparability</td><td>A qualitative measure of the confidence that data may be considered to be equivalent for each sampling and analytical event. By use of standard procedures, comparable methods, qualified personnel and review of sample integrity.</td></tr>
<tr><td>Completeness</td><td>A measure of the amount of usable data (expressed as a percentage - %) from a data collection activity, based on completeness of test program, overall QA/QC completeness and validity of data set.</td></tr>
</table>

6 Ongoing Monitoring Program

6.1 OMP SAQP History

The changes made to the OMP SAQP since the Rev1 are documented in **Error! Reference source not found.**.

Table 6-1 OMP SAQP History

SAQP Version	Date	Report Section	Changes	Justification
Rev 2	17/12/2019	-	Formatting and figures updates, minor changes.	Defence review
Rev 3	18/08/2020	7	Update of assessment criteria and reference to HEPA (2020).	New guideline (HEPA, 2020)
		6.3	Replacement of decommissioned groundwater bores MW247, MW250 and MW260 by newly installed MW516, MW517, MW518 (respectively). Replacement of destroyed bore MW262 by MW010.	Monitoring network updates.
Rev 4	10/03/2021	6.3	Table 6-4 'Wells construction details' added.	Defence review
		6	Methodology tables updates	

6.2 Management Area Description

HMAS Stirling Garden Island and the marine nearshore environment are referred to as the "Management Area" (RPS, 2018c). The Management Area boundaries are presented on Figure 2, Appendix A.

6.3 Groundwater Monitoring

6.3.1 Groundwater Monitoring Network

The groundwater monitoring network sampled as part of the previous investigations at the Site is summarised in Table 6-2.

Table 6-2 HMAS Stirling Groundwater Monitoring Network

Location	Screened aquifer	Well ID	Average Screen Interval (mBGL)
Demolition Ground	Superficial	MW137, MW139, MW141, MW142, MW147, MW149, MW272	3-6
Fire Training Area	Superficial	MW109, MW112, MW117, MW120, MW121, MW123, MW124, MW125, MW126, MW127, MW128.	3-6
WWTP	Superficial	MW158, MW161, MW166, MW171, MW172, MW173, MW193, MW195, MW196, MW197, MW199, MW200, MW202, MW203	No Log Available
	Deep	MW195D	10 - 13
Helicopter Support Facility	Superficial	MW214S, MW215S, MW216S, MW217S, MW220S, MW224S, MW225S, MW226S, MW227S, MW228S, MW282S	4 - 7
AVCAT Storage and Fuel Farm	Superficial	MW233, MW236, MW238, MW239, MW240, MW242, MW243, MW245, MW247, MW248, MW249	No Log Available

Location	Screened aquifer	Well ID	Average Screen Interval (mBGL)
	Deep	MW274D, MW291D	No Log Available
Fire Station, Flammable/ Hazardous Goods and Waste Storage, Ship Sullage	Superficial	MW250, MW255S, MW256S, MW257S, MW258S, MW259S, MW260, MW261S, MW262S	3 - 6
Dredged Sediments	Superficial	MW264, MW268, MW269	2.5 – 5.5
Accommodation Area	Superficial	MW288, MW289	2.7 – 6.7
Source: RPS DSI Table A (PRS, 2018b) and ESdat database			

The groundwater monitoring locations as part of the OMP monitoring are presented in Table 6-3, along with the rationale for the selection, and are shown on Figures 3A-E, Appendix A.

Table 6-3 OMP Groundwater Monitoring Locations

Area	Monitoring Well / Bore ID	Rationale
Fire Training Area (Figure 3C)	MW109, MW112, MW117, MW120, MW121, MW123, MW124, MW125, MW126, MW127, MW128	Confirmation of overall PFAS impact identified in the DSI (GHD, 2018). Assessment of overall changes in PFAS concentration in the source areas to provide temporal data on depletion of the source zone. Confirm the level of risk identified in the ERA.
Demolition Ground (Figure 3B)	MW137, MW139, MW141, MW142, MW147, MW149, MW272	
WWTP (Figure 3D)	MW158, MW161, MW166, MW171, MW172, MW173, MW193, MW196, MW197, MW199, MW200, MW202, MW203, MW195D, MW195S	
Accommodation Area (Figure 3D)	MW288, MW289	
Helicopter Support Facility (Figure 3F)	MW214, MW215, MW216, MW217, MW220, MW224, MW225, MW226, MW227, MW228, MW282	
Dredge Spoil / Careening Bay (Figure 3E)	MW264, MW268, MW269	
AVCAT Storage and Fuel Farm (Figure 3E)	MW233, MW236, MW238, MW239, MW240, MW242, MW243, MW245, MW516, MW248, MW249	
Fire Station, Flammable / Hazardous Goods and Waste Storage, Ship Sullage (Figure 3E)	MW517, MW255, MW256, MW257, MW258, MW259, MW518, MW261, MW010	

Construction details for the groundwater wells monitored as part of the OMP are provided in Table 6-4.

Table 6-4 OMP Groundwater Monitoring Wells Construction Details

Well ID	Date drilled	Easting[1]	Northing[1]	RL TOC (mAHD)	Depth (mbTOC)	Screen interval (mbTOC)
MW010*		376706.29	6433707.06	4.859	9.2	
MW109	2017	375573.399	6436243.395	4.446	5.5	2.5 - 5.5
MW112	2008	375513.7	6436208.38	3.973	6.0	3.0 - 6.0
MW117	2008	375547.34	6436179.57	3.762	6.0	3.0 - 6.0
MW120	2017	375449.982	6436134.215	4.409	5.5	2.5 - 5.5
MW121	2008	375552.25	6436122.78	3.7	5.7	2.7 – 5.7
MW123	2017	375585.05	6436093.989	6.62	8.0	4.5 - 8.0
MW124	2017	375835.849	6436297.305	1.899	4.0	0.750 - 4.0
MW125	2017	375846.238	6436213.778	1.882	3.9	0.9 - 3.9
MW126	2017	375873.534	6436085.061	1.948	3.9	0.9 - 3.9
MW127	2017	375925.611	6435948.027	1.771	3.9	0.9 - 3.9
MW128	2017	375670.344	6436212.685	4.537	5.5	2.5 - 5.5
MW137	2017	375031.276	6440162.672	2.058	3.9	0.9 - 3.9
MW139	2009	374964.76	6440104.47	2.273	5.0	2.0 - 5.0
MW141	2009	375021.66	6440143.5	3.025	5.0	2.0 - 5.0
MW142	2017	375033.148	6440146.157	2.573	4.0	0.25 - 4.0
MW147	2009	375032.34	6440124.29	3.423	5.0	2.0 - 5.0
MW149	2017	375064.008	6440095.63	2.303	4.0	1.0 - 4.0
MW158*		375550.33	6435719.4	14.541	15.8	
MW161*		375133.59	6435570.74	17.225	18.13	
MW166*		375049.03	6435410.26	11.89	13.0	10.0 - 13.0
MW171	2008	375226.79	6435237.5	29.238	31.5	28.5 - 31.5
MW172*		375283.14	6435355.8	16.772	26	
MW173*		375430.81	6435284.52	10.08	11.11	
MW193	2009	375508.55	6435098.21	11.86	13.5	10.5 - 13.5
MW195S	2008	375735.25	6435293.18	4.571	6.5	3.5 - 6.5
MW195D	2008	375737.03	6435293.35	4.363	13.0	10.0 - 13.0
MW196*		375995.91	6435294.6	12.75	13.8	
MW197*		376173.35	6435289.71	2.28		
MW199*		376029.54	6435161.036	11.8		
MW200*		376257.05	6435163.648	2.07		
MW202*		376468.79	6434833.07	2.121		
MW203*		376155.58	6434834.12	10.855		
MW214	2017	375891.231	6432273.413	8.075	9.0	5.5 - 9.0
MW215	2017	375849.425	6431907.202	3.794	4.5	1.5 - 4.5
MW216	2017	376015.304	6432232.151	8.329	9.0	6.0 - 9.0
MW217	2017	376182.988	6432372.132	8.847	9.5	6.5 - 9.5
MW220*		376260.7742	6432333.207			
MW224	2017	376270.928	6432090.977	13.372	14.25	11.25 - 14.52

Well ID	Date drilled	Easting[1]	Northing[1]	RL TOC (mAHD)	Depth (mbTOC)	Screen interval (mbTOC)
MW225	2017	376605.45	6431932.234	4.066	5.0	2.0 - 5.0
MW226	2017	376798.645	6432087.539	1.749	3.8	0.75 - 3.8
MW227	2017	376522.067	6432424.034	2.961	4.2	1.25 - 4.2
MW228	2017	376443.972	6432563.872	2.23	3.75	0.75 - 3.75
MW233*		376680.16	6434320.8	3.705	4.968	
MW236*		376256.45	6434168.67	4.6442	5.66	
MW238*		376846.72	6434047.83	4.827		
MW239*		376897.75	6434047.61	4.03		
MW240*		376825.33	6433978.29	4.483	6.8	
MW242*		376976.09	6434000.26	3.539	4.76	
MW243*		376825.22	6433936.86	4.892	7.0	
MW245*		376918.69	6433941.94	4.551	5.65	
MW248*		376882.99	6433798.12	4.073		
MW249	2017	377131.46	6433911.436	5.227	6.5	3.5 - 6.5
MW255	2017	376282.378	6433831.895	4.609	6.0	3.0 - 6.0
MW256	2017	376342.186	6433831.509	3.835	6.0	3.0 - 6.0
MW257		376331	6433783	3.806	5.7	2.7 - 5.7
MW258		376320	6433758	4.043	6.0	3.0 - 6.0
MW259		376344	6433757	3.8	5.5	2.5 - 5.5
MW261*		376708.09	6433728.72	3.858	6.0	3.0 - 6.0
MW264	2017	376489.703	6433743.883	4.806	6.0	3.0 - 6.0
MW268	2017	376478.133	6433571.27	4.056	5.5	2.5 - 5.5
MW269	2017	376550.817	6433619.688	4.153	5.5	2.5 - 5.5
MW272	2017	375049.57	6440126.174	2.226	3.9	0.9 - 3.9
MW282	2017	376070.828	6432003.232	5.78	7.5	4.5 - 7.5
MW288	2017	376735.953	6434566.951	4.003	5.25	2.25 - 5.25
MW289	2017	376599.58	6434490.565	4.495	6.25	3.25 - 6.25
MW516		376896.36	6433825.69	6.37	7.5	4.5 - 7.5
MW517		376262.67	6433884.6	4.77	6.0	3.0 - 6.0
MW518		376660.14	6433729.67	5.55	6.5	3.5 - 6.5

Notes:
1. MGA94 zone 50
RL – Relative Level
TOC – Top of Casing
* No bore log available

6.3.2 Monitoring Frequency

All groundwater monitoring locations listed in Table 6-3 will be sampled quarterly for 24 months. The main sampling events will be undertaken in March, June. September and December to record the concentration and extent of PFAS and determine any seasonal fluctuations or trends.

6.3.3 Groundwater Sampling Methodology

Groundwater monitoring will be undertaken by no purge HydraSleeve® method as detailed in Table 6-5.

Table 6-5 Groundwater Monitoring Wells – Sampling Method

Activity	Details
Well Gauging	Standing Water Level (SWL) will be gauged in each well prior to sampling using an interface probe. All wells will be measured against a specified mark at the top of the well casing. Gauging time will be recorded on field records. Snap gauging will be undertaken in each areas presented on Figure 3A to take in consideration the tide influence when inferring the groundwater contours.
Groundwater Field Parameters	The field parameters will be recorded via a down-hole water quality meter (positioned within the mid screen interval) prior to deployment of HydraSleeves® or pre-sample collection. The following field parameters will be recorded using a water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Once field parameters have stabilised (as indicated by at least three consecutive measurements falling within +/- 10% of each other) measurement will be recorded on field data records. All field instruments (e.g. water quality meter) will be calibrated by the equipment supplier and daily readings of reference solutions (bump tests) completed to optimise the accuracy of the measurements taken.
Deployment and Retrieval of HydraSleeves (single level well sample collection)	HydraSleeve will be deployed with top weight sample collection to begin at the lowest point. HydraSleeve sampling devices will be left in wells for a minimum of 4 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples will be collected via continuous pull method at a rate allowing the water to pass through the check value into the sample sleeve. Samples will be discharged immediately (minimise changes in chemistry) via discharge tube.
Alternative sampling methodology (hand bailing)	Disposable HDPE hand bailers, attached to a polypropylene string, will be used in the event that the water column isn't sufficient to fill the hydrasleeve. Purging of the well will be undertaken prior to sampling to ensure that a sample representative of the aquifer is taken.
Field Records	Field records will include the following information: ▪ Sampling time, date and name of the sampler. ▪ Weather conditions. ▪ Sample Collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. ▪ Calibration and daily bump test records. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures will be retained within project files.
Decontamination procedure	Dedicated HydraSleeves will be used at each groundwater bore thus removing the need for decontamination. All re-usable sampling equipment will be thoroughly washed using PFAS-free detergent then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample will be labelled with the sample location, date, project identification number and sampler's initials. Samples will be collected directly in appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation.

Activity	Details
	Sample containers, preservation procedures, sample storage requirements and holding times will be undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate). All holding times will comply with the requirements set out in "Australian Standard AS/NZS 5567.1:1998 and AS 4482.1".
Laboratory Testing	▪ Full PFAS analytical suite (see Appendix B). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance) ▪ Total Organic Carbon (TOC), total suspended solids (TSS), total dissolved solids (TDS) and pH.
Laboratory Testing – Quality Control	Groundwater QC samples will be collected at the following frequencies as detailed in the OMP (DoD, 2019): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples should be sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day per field personnel [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Field blank samples at 1 per day per eskie.
Laboratory Accreditation and Limits of Reporting	All groundwater analysis will be undertaken by laboratories accredited by the NATA. ▪ Primary analysis will be undertaken by ALS Global Laboratories (Perth) ▪ Secondary analysis will be undertaken by Eurofins (Perth). Laboratory LORs will be suitable to meet the relevant adopted assessment levels (0.01 µg/L).

6.4 Porewater, Surface Water and Sediment Monitoring

6.4.1 Monitoring Locations

The surface water, porewater and sediment locations, sampled as part of the DSI (RPS, 2018b) are summarised in Table 6-6.

Table 6-6 Summary of Porewater Surface Water and Sediment Monitoring Locations (RPS, 2018b)

Location	Porewater Monitoring Location	Sediment Monitoring Location	Surface Water Monitoring locations
Fire Training Area	PW129, PW130, PW131, PW132, PW133, PW134, PW135, PW136	SD129, SD130, SD131, SD132, SD133, SD134, SD135, SD136	SW129, SW130, SW131, SW132, SW133, SW134, SW135, SW136
Demolition Ground	PW150, PW151, PW152, PW153, PW154, PW155, PW156, PW157	SD150, SD151, SD152, SD153, SD154, SD155, SD156, SD157	SW150, SW151, SW152, SW153, SW154, SW155, SW156, SW157
WWTP	PW204, PW205, PW206, PW207, PW208	SD159, SD162, SD165, SD168, SD187, SD189, SD190, SD192, SD204, SD205, SD206, SD207, SD208	SW160, SW167, SW175, SW178, SW181, SW188, SW191, SW204, SW205, SW206, SW207, SW208
Helicopter Support Facility	PW229, PW230, PW231, PW232	SD229, SD230, SD231, SD232	SW229, SW230, SW231, SW232
Dredged Sediments	PW270, PW271	SD270, SD271	SW270, SW271
Dredge Spoil / Careening Bay	PW374, PW375, PW378	SD374, SD375, SD378	SW317, SW318, SW319

The porewater and sediment co-located monitoring locations and surface water monitoring locations are presented in Table 6-7 along with the rationale for the selection, and are highlighted on Figures 3A-F, Appendix A.

Table 6-7 OMP Surface Water, Porewater and Sediment Monitoring Locations

Area	Surface water Sampling Location ID	Sediment Sampling Location ID	Porewater Sampling Location ID	Rationale
Fire Training Area (Figure 3C)	SW130, SW132, SW134	SD335, SD340, SD341, SD362, SD363, SD364	PW335, PW340, PW341, PW362, PW363, PW364	Monitoring of these locations will provide an indication of any change in the nature or magnitude of PFAS in surface water, porewater and sediments, and will help in determining changes attributable to seasonal fluctuations. Confirm the level of risk identified in the ERA.
Demolition Ground (Figure 3B)	SW150, SW152, SW154, SW156	SD329, SD330, SD331, SD356, SD357, SD358	PW329, PW330, PW331, PW356, PW357, PW358	
WWTP (Figure 3D)	SW305, SW370, SW371, SW372, SW373, SW353, SW382, SW383, SW384	SD304, SD345, SD367, SD368, SD369, SD350, SD351, SD352, SD380, SD381, SD401	PW304, PW345, PW367, PW368, PW369, PW350, PW351, PW352, PW380, PW381, PW401	
Accommodation Area (Figure 3D)		SD346	PW346	
Helicopter Support Facility (Figure 3F)	SW309, SW310, SW311, SW406, SW408, SW410, SW412, SW414, SW416	SD306, SD307, SD308, SD314, SD315, SD316, SD405, SD407, SD409, SD411, SD413, SD415	PW306, PW307, PW308, PW314, PW315, PW316, PW405, PW407, PW409, PW411, PW413, PW415	
Dredge Spoil / Careening Bay	SW317, SW318, SW319	SD374, SD375, SD378	PW374, PW375, PW378	

6.4.2 Surface Water, Porewater and Sediment Monitoring Frequency

The surface water, porewater and sediment monitoring locations listed in Section 6.4.1 will be sampled four times per year, in March, June, September and December to record the concentration and extent of PFAS and determine any seasonal fluctuations or trends.

This sampling should be conducted in conjunction with the groundwater monitoring described in Section 6.3

6.4.3 Surface Water Sampling Methodology

The methodology for the surface water monitoring is detailed in Table 6-8.

Table 6-8 Surface Water Investigation Methodology

Item	Details
Field parameters	Surface water physiochemical parameters (i.e. pH, electrical conductivity (EC), oxidation reduction potential (ORP), dissolved oxygen (DO), and temperature) will be recorded at the time of sampling using a pre-calibrated water quality meter. Field observations such as odours or sheen presence must also be recorded on field sampling sheets.
Sampling Method	Surface water samples will be collected directly into sample containers using a 'Grab' (manual) sample method via a long-handled sampling device. The sample container will be positioned 10 cm below the surface water level and above the sediment bed and oriented with the capped opening facing downwards to avoid the collection of surface films. Samples will be decanted into the laboratory supplied sample containers. Samples will be collected in accordance with Australian/New Zealand Standards (AS/NZS 5667.1:1998) '*Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*'.
Sample Collection	Water samples will be placed directly into appropriately labelled, laboratory supplied sample bottles and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation.
Decontamination	All re-usable sampling equipment will be thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation, transport and holding times.	Each sample will be labelled with the sample location, date, project identification number and sampler's initials. Samples will be contained in appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times will be undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate). ▪ All holding times will comply with the requirements set out in "Australian Standard AS/NZS 5567.1:1998 and AS 4482.1".
Field Records	Field records will include the following information: ▪ Sampling time, date and name of the sampler. ▪ Weather conditions. ▪ Sample Collection method. ▪ Depth of water body and sample. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. ▪ Calibration records. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures will be retained within project files.
Laboratory Testing	Surface water samples will be analysed for the following: ▪ Full PFAS analytical suite (see Appendix B).

Item	Details
	▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride sulfate, alkalinity and ionic balance) ▪ TOC, TSS, TDS and pH.
Laboratory Testing – Quality Control	Surface water QC samples will be collected at the following frequencies as detailed in the OMP: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples should be sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)].
Laboratory Accreditation and Limits of Reporting	All surface water analysis will be undertaken by laboratories accredited by the NATA. ▪ Primary analysis will be undertaken by ALS Global Laboratories (Perth) ▪ Secondary analysis will be undertaken by Eurofins (Perth). Laboratory LORs will be suitable to meet the relevant adopted assessment levels (0.01 µg/L).

6.4.4 Sediment and Porewater Sampling Methodologies

The methodologies for sediment and porewater sampling are detailed in Table 6-9 and Table 6-10 respectively.

Table 6-9 Sediment Investigation Methodology

Item	Details
Sediment Sample Collection	Sediment samples will be collected at the sediment/water interface using hand tools (e.g. trowel, hand auger, PVC pipe etc.) with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation. At each sampling location, the sediment sample will be visually assessed and observations (including physical description) recorded on field data sheets.
Field Records	Field records will include the following information: ▪ Sampling time, date and name of the sampler. ▪ Sample description and location characteristics. ▪ Weather conditions. ▪ Sample Collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures will be retained within project files.
Decontamination	All re-usable sampling equipment will be thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Laboratory Testing	Sediment samples will be analysed for the following: ▪ Full PFAS analytical suite (see Appendix B). ▪ TOC, EC, cation exchange capacity (CEC) and pH
Laboratory Testing – Quality Control	Sediment QC samples will be collected at the following frequencies as detailed in the OMP: ▪ Field duplicate (intra-laboratory) samples greater than 1 per 20 sediment samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples greater than 1 per 20 sediment samples should be sent to a secondary laboratory.
Laboratory Accreditation and Limits of Reporting	All sediment analysis will be undertaken by laboratories accredited by the NATA. ▪ Primary analysis will be undertaken by ALS Global Laboratories (Perth) ▪ Secondary analysis will be undertaken by Eurofins (Perth).

Item	Details
	Laboratory LORs will be suitable to meet the relevant adopted assessment levels (0.005 mg/kg).

Table 6-10 Porewater Investigation Methodology

Item	Details
Porewater Sample Collection	Porewater sampling will be undertaken in accordance with the USEPA guidance *Operating Procedure Pore Water Sampling*. Porewater will be purged and sampled at less than 1 L per minute using a peristaltic pump, connected to a stainless steel tube with a screened section at its base (Drive-Point Piezometer). The pore water sampler will be inserted to at least 1 m below the surficial marine sediments, to ensure collection of pore water rather than surface water.
Field Records	Field records will include the following information: ▪ Sampling time, date and name of the sampler. ▪ Weather conditions. ▪ Sample Collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures will be retained within project files.
Decontamination	All re-usable sampling equipment will be thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection. Tubing will be replaced at each sampling location.
Laboratory Testing	Porewater samples will be analysed for the following: ▪ Full PFAS analytical suite (see Appendix B). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride sulfate, alkalinity and ionic balance) ▪ TOC, TSS, TDS and pH.
Laboratory Testing – Quality Control	Porewater QC samples will be collected at the following frequencies as detailed in the OMP: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 porewater samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 porewater samples should be sent to a secondary laboratory.
Laboratory Accreditation and Limits of Reporting	All porewater analysis will be undertaken by laboratories accredited by the NATA. ▪ Primary analysis will be undertaken by ALS Global Laboratories (Perth) ▪ Secondary analysis will be undertaken by Eurofins (Perth). Laboratory LORs will be suitable to meet the relevant adopted assessment levels (0.01 µg/L).

7 Assessment Criteria

7.1 Groundwater, Porewater and Surface Water

The assessment levels adopted for groundwater, porewater and surface water in this OMP are based upon the Heads of Environmental Protection Authorities Australia and New Zealand (2018) PFAS National Environmental Management Plan 2.0 (NEMP; HEPA 2020) and finding of previous site assessment i.e. Detailed Site Investigation (DSI) (RPS, 2018b). The adopted assessment criteria for groundwater, porewater and surface water are detailed in Table 7-1.

Table 7-1 Criteria for Groundwater, Porewater and Surface Water

Receptor	Adopted Assessment Criteria
Ecological	**99% species protection level for Fresh Water and interim Marine Water:** ▪ PFOS – 0.00023* µg/L ▪ PFOA – 19 µg/L
Human Health	**Recreational Water:** ▪ PFOS + PFHxS – 2.0 µg/L ▪ PFOA – 10 µg/L **Drinking Water:** ▪ PFOS + PFHxS – 0.07 µg/L ▪ PFOA – 0.56 µg/L
*The criterion of 0.00023 µg/L is lower than the laboratory level of reporting (LOR), however, the PFAS NEMP 2020 allows for the adoption of the laboratory LOR as a screening level rather than a quantified measurement. At a minimum, the LOR to be adopted is to be consistent with the LORs in the DSI (RPS, 2018b).	

7.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment. Criteria for sediment samples are consistent with those adopted for the DSI and ERA and are presented in Table 7-2.

Table 7-2 Criteria for Sediment

Receptor	Adopted Assessment Criteria
Ecosystems	**Ecological – direct exposure (interim guidelines)** ▪ PFOS – 1 mg/kg ▪ PFOA – 10 mg/kg
	Ecological – indirect exposure (interim guidelines) ▪ PFOS – 0.01 mg/kg
Human Health	**Commercial / industrial (on-base activities)** ▪ PFOS + PFHxS – 20 mg/kg ▪ PFOA – 50 mg/kg

8 Reporting

8.1 Factual Reporting

A factual report should be produced at the completion of each monitoring event that summarises the data and findings of each monitoring event. Each factual report will present the findings and contain the following information:

> Introduction

> Scope of work completed.

> Description of sampling methodologies used.

> Field observations (e.g. condition of monitoring wells, description of purged water) and water quality parameter measurements.

> Summary of any changes to the monitoring network condition that may affect data integrity, or require rectification works, and recommendations for repair, replacement of decommissioning of a location

> Evaluation of the applicability of adopted assessment levels.

> Review of the suitability of the data for assessment purposes (QA/QC evaluation).

> Summary tables presenting gauged groundwater and surface water levels.

> Presentation of inferred groundwater contours and inferred groundwater flow direction in a figure.

> Summary tables of analytical results in comparison to adopted assessment levels.

> Graphs showing historical concentrations of PFOS, PFOA and PFOS plus PFHxS.

> Laboratory reports, Chain of Custody (CoC) documentation, field sampling records, data validation and QA/QC details, equipment calibration certificates and other relevant documentation.

In the event that further investigation, management and/or remediation are required, recommendations will be presented in a separate ‘technical memorandum’.

8.2 Interpretive Reporting

Upon completion of each year’s monitoring period an interpretative report will be prepared. As a minimum, each interpretative report should include the following:

> The factual information described in Section 8.1.

> Evidence of compliance with the requirements of the SAQP and meeting stated objectives of the OMP.

> Relevant figures depicting sampling locations and site-specific hydrogeological features.

> Laboratory results and analysis including comparison with relevant screening criteria as identified in each OMP.

> Assessment and commentary on appropriate Quality Assurance/ Quality Control (QA/QC) procedures.

> A discussion of analytical results in relation to the following:

- Trends in PFAS concentrations, including an assessment of temporal changes and/or changes to the extent of PFAS impacts. Trends should be assessed using an appropriate statistical analysis approach (e.g. using Mann-Kendall or similar analysis), with a specified level of confidence based upon the number of monitoring rounds completed.
- Consideration, based on data trends, as to whether any of the existing remediation / management measures should be re-assessed, with a view to potential modification, supplementation or cessation.
- Assessment of whether changes to the CSM and/or risk assessment are required.
- Whether recalibration or changes to the groundwater model are required to provide a better understanding of the potential future extent of PFAS impact in groundwater.

- Based on the data obtained, an assessment of the OMP sampling requirements with a view to establishing whether:
  - The number of locations monitored could be reduced, such as where PFAS concentrations are stable and are considered to present a low risk to receptors.
  - Additional monitoring locations are required, including the installation of new monitoring wells or sampling of additional existing wells to provide better understanding of the nature, extent or magnitude of PFAS impacts in a particular portion of the Management Area.
  - The frequency of monitoring should increase or decrease to provide better understanding of PFAS concentration fluctuations and potential risks to receptors.
  - Monitoring of additional media should be included in the OMP.
- An overview of remedial works or construction and maintenance activities undertaken in the management area during the reporting period, which may impact the CSM
- A statement as to whether the risk profile has changed overall, or for any specific location at the Site, and a recommendation as to whether this should trigger an OMP and/or PMAP review, or other action.

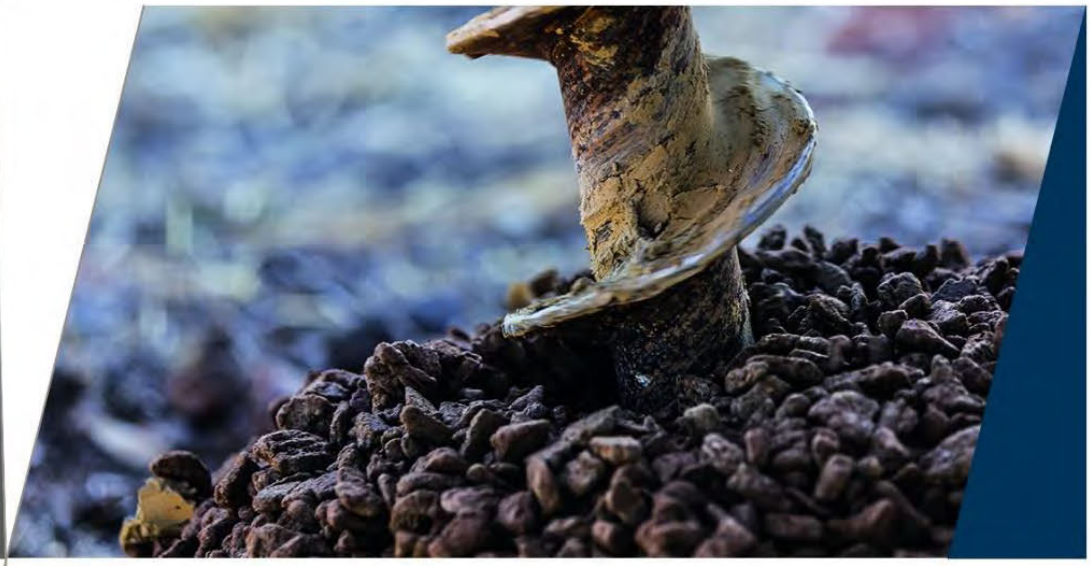
9 References

General References

1. Australian Standard AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 – Non-volatile and semi-volatile compounds.
2. Australian Standard AS 4482-1999 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 2 – Volatile substances.
3. Australian and New Zealand Guidelines, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality.
4. Contaminated Sites Act 2003, Western Australia.
5. Department of Defence, Department of Energy, 2018, Quality System Manual Schedule B15.
6. Department of Environment Regulation (DER), 2014, Assessment and Management of Contaminated Sites.
7. Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, PFAS National Environmental Management Plan 2.0 (NEMP).
8. National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013) (ASC NEPM).
9. National Health and Medical Research Council (NHMRC), August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.
10. Standards Australia 1998. AS/NZ 5667:1998 Water quality – sampling.
11. U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
12. USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.

Site Specific References

13. Department of Defence, January 2019, HMAS Stirling Garden Island PFAS Management Area Plan, Final.
14. RPS, October 2018, HMAS Stirling - PFAS Ongoing Monitoring Plan, Ref. EEC16094.005 (RPS, 2018a).
15. RPS, May 2018, Detailed Site Investigation – HMAS Stirling PFAS Investigation, Ref. EEC16094.003 (RPS, 2018b).
16. RPS, September 2018, HMAS Stirling Garden Island PFAS Investigation Ecological Risk Assessment. Ref. EEC16094.009 (RPS, 2018c).
17. GHD, September 2016, Jones Lang LaSalle. Defence PFAS Environmental Management Preliminary Sampling Program – HMAS Stirling (Garden Island)
18. GHD, October 2019, HMAS Stirling Stage 1 Preliminary Site Investigation.
19. GHD, June 2020, HMAS Stirling Stage 2 Detailed Site Investigation (Mobilisation 1).
20. Cardno, 16 April 2020, PFAS OMP 2019 Q4 Quarterly Monitoring Factual Report, HMAS Stirling
21. Cardno, 14 May 2020, PFAS OMP 2020 Q1 Quarterly Sampling Event Factual Report, HMAS Stirling
22. Cardno, 23 September 2020, PFAS OMP 2020 Q2 Quarterly Sampling Event Factual Report
23. Cardno, 8 January 2020, PFAS OMP 2020 Q3 Quarterly Sampling Event Factual Report



APPENDIX

A

Figures

FIGURE 1

1:32,000 Scale at A3

Meters

0 500 1,000

Site Location

SAMPLING AND ANALYSIS QUALITY PLAN
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-001_RegionalLocation 02.mxd
Aerial Imagery Supplied by Google Earth

FIGURE 2

1:32,000 Scale at A3

Meters

0 500 1,000

Management Area

SAMPLING AND ANALYSIS QUALITY PLAN
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-002_ManagementArea 02.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

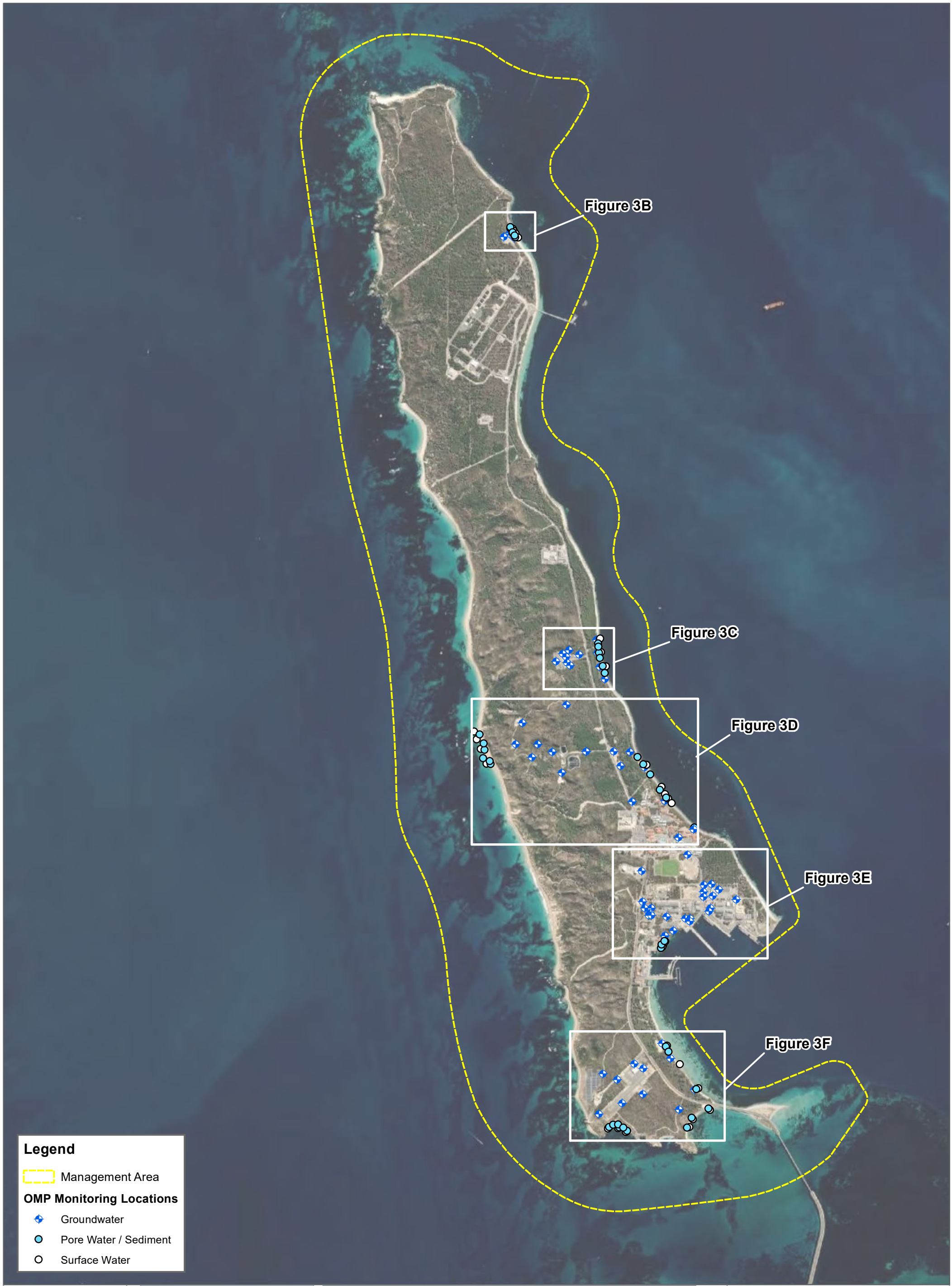


FIGURE 3A

1:32,000 Scale at A3

Meters

0 500 1,000

Monitoring Locations

SAMPLING AND ANALYSIS QUALITY PLAN
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003A_MonitoringLocations 03.mxd
Aerial Imagery Supplied by Google Earth

FIGURE 3B

1:750 Scale at A3

Meters

0 25 50

Monitoring Locations

SAMPLING AND ANALYSIS QUALITY PLAN
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003B_DemolitionGroundLocations 03.mxd
Aerial Imagery Supplied by Nearmap

FIGURE 3C

1:2,000 Scale at A3

Meters

0 50 100

Monitoring Locations

SAMPLING AND ANALYSIS QUALITY PLAN
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003C_FireTrainingAreaLocations 03.mxd
Aerial Imagery Supplied by Nearmap

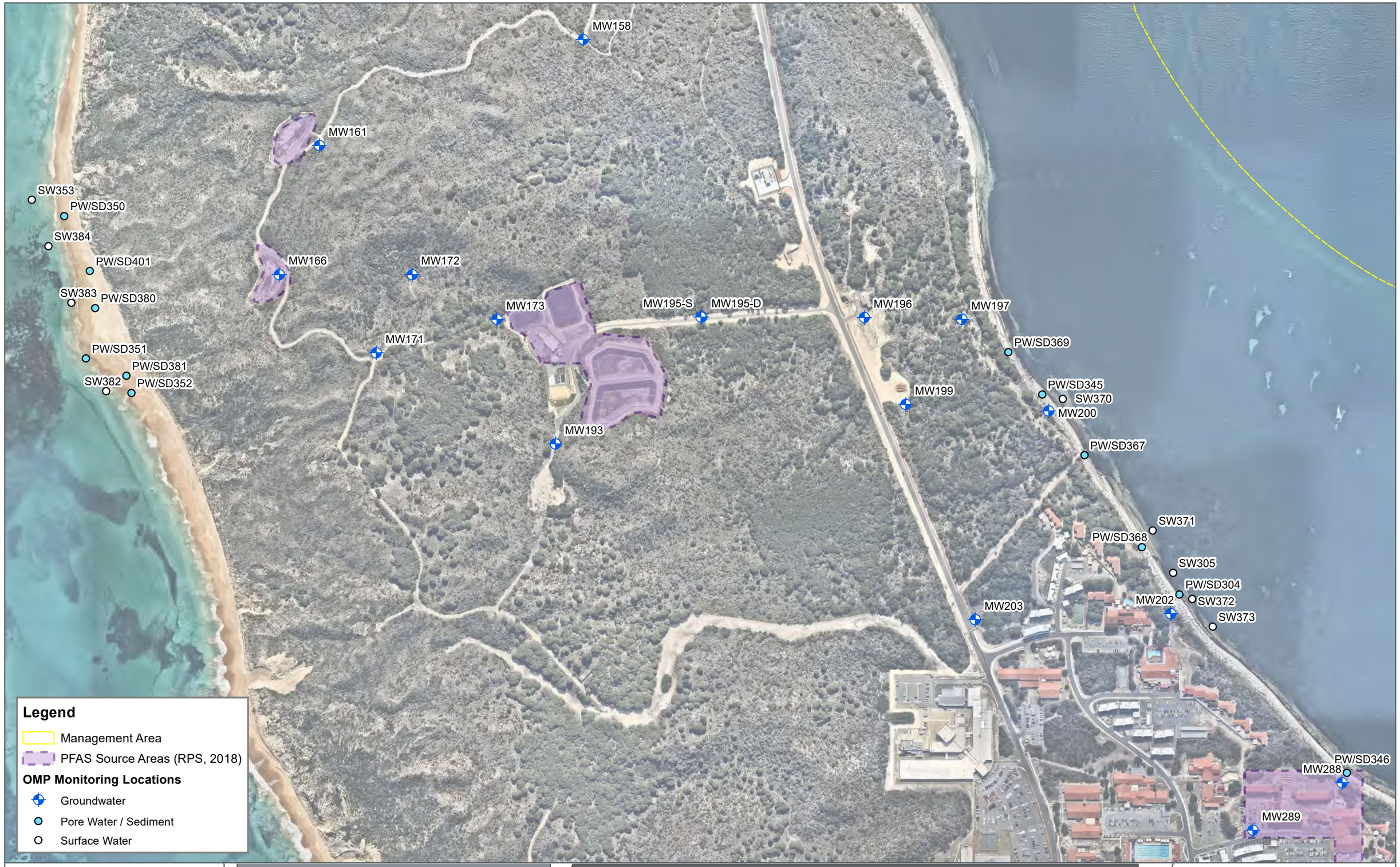


FIGURE 3D

1:5,500 Scale at A3

Meters

0 100 200

Monitoring Locations

SAMPLING AND ANALYSIS QUALITY PLAN
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003D_WWTPLocations 03.mxd
Aerial Imagery Supplied by Nearmap

FIGURE 3E

1:3,900 Scale at A3

Meters

0 100 200

Monitoring Locations

SAMPLING AND ANALYSIS QUALITY PLAN
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003E_MainBaseLocations 03.mxd
Aerial Imagery Supplied by Nearmap

MW228
PW/SD405
SW406
PW/SD407
MW227
SW408
MW217
MW220
MW214
MW216
SW410
MW226
PW/SD409
MW224
MW282
MW225
PW/SD411
SW412
MW215
PW/SD413
SW414
PW/SD314
PW/SD315
PW/SD306
PW/SD307
PW/SD316
PW/SD415
SW416
SW309
SW310
PW/SD308
SW311

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

OMP Monitoring Locations

- Groundwater
- Pore Water / Sediment
- Surface Water

FIGURE 3F

1:3,500 Scale at A3

Meters

0 100 200

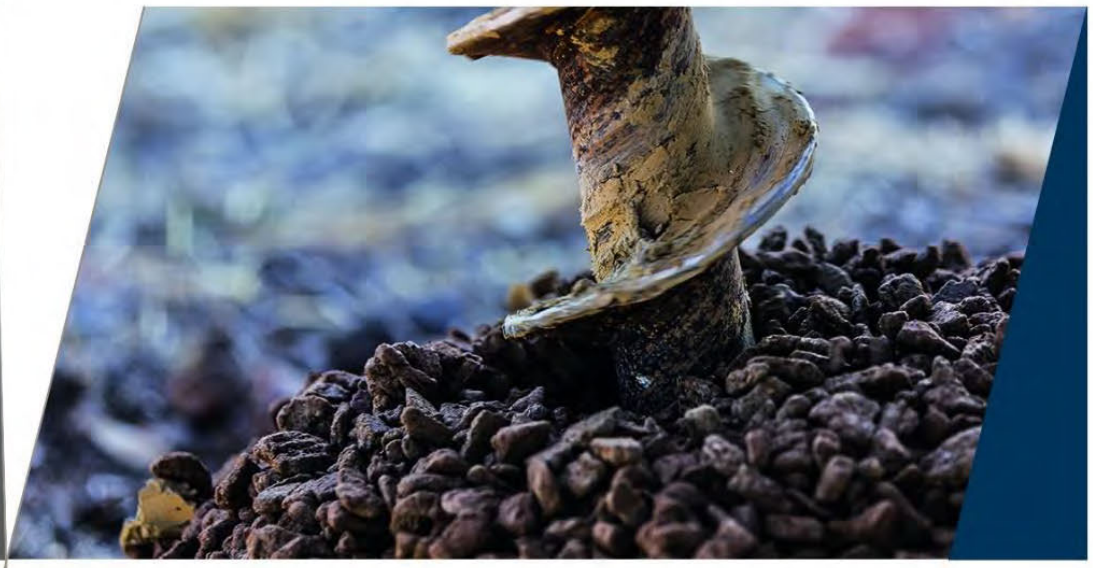
Monitoring Locations

SAMPLING AND ANALYSIS QUALITY PLAN
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003F_HSFLocations 03.mxd
Aerial Imagery Supplied by Nearmap



APPENDIX

B

Full PFAS Analytical Suite

Full PFAS Analytical Suite

Group	Analyte	CAS No.
Perfluoroalkane Sulfonic Acids	Perfluorobutane sulfonic acid (PFBS)	375-73-5
	Perfluoropentane sulfonic acid (PFPeS)	2706-91-4
	Perfluorohexane sulfonic acid (PFHxS)	355-46-4
	Perfluoroheptane sulfonic acid (PFHpS)	375-92-8
	Perfluorooctane sulfonic acid (PFOS)	1763-23-1
	Perfluorodecane sulfonic acid (PFDS)	335-77-3
Perfluoroalkane Carboxylic Acids	Perfluorobutanoic acid (PFBA)	375-22-4
	Perfluoropentanoic acid (PFPeA)	2706-90-3
	Perfluorohexanoic acid (PFHxA)	307-24-4
	Perfluoroheptanoic acid (PFHpA)	375-85-9
	Perfluorooctanoic acid (PFOA)	335-67-1
	Perfluorononanoic acid (PFNA)	375-95-1
	Perfluorodecanoic acid (PFDA)	335-76-2
	Perfluoroundecanoic acid (PFUnDA)	2058-94-8
	Perfluorododecanoic acid (PFDoDA)	307-55-1
	Perfluorotridecanoic acid (PFTrDA)	72629-94-8
	Perfluorotetradecanoic acid (PFTeDA)	376-06-7
Perfluoroalkyl Sulfonamides	Perfluorooctane sulphonamide (FOSA)	754-91-6
	N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8
	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2
	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7
	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2
	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9
	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6
(n:2) Fluorotelomer Sulfonic Acids	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4
	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2
	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4
	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0

About Cardno

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APPENDIX

C

FACTUAL REPORTS

Cardno

now

Stantec

PFAS OMP Quarterly Sampling Event Factual Report

December 2020

HMAS Stirling

DEF19009

Prepared for

Department of Defence

4 May 2021

Cardno®

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

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Chemical Names

DOC	Dissolved Organic Carbon
DO	Dissolved Oxygen
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Per-fluoro-hexane Sulphonate
PFOA	Per-fluoro-octanoic Acid
PFOS	Per-fluoro-octane Sulfonate
TDS	Total Dissolved Solids (salinity of water)
TOC	Total Organic Carbon
TSS	Total Suspended Solids

Technical Terms

AFFF	Aqueous Film-Forming Foam
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
BGL	Below Ground Level
CEC	Cation Exchange Capacity
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
RWL	Reduced water levels
SAQP	Sampling and Analysis Quality Plan
SWL	Standing water level

Units

ha	Hectares
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

OMP	Ongoing Monitoring Plan
FTG	Fire Training Ground
HSF	Helicopter Support Facility

1 Introduction

1.1 Background

Cardno was engaged by the Australian Department of Defence ("the Client") to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) at HMAS Stirling ("the site"). The site is located on Garden Island, Western Australia and is displayed in Figure 1 of Appendix A.

The OMP was carried out in accordance with the scope and limitations presented in Cardno's Sampling and Analysis Quality Plan (SAQP):

> Cardno, 18 August 2020, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) HMAS Stirling'.

The SAQP was reviewed prior to the monitoring event and groundwater monitoring well MW262 (destroyed) was replaced by nearby suitable well MW010.

For the purposes of this report:

> Management Area was defined as comprising of Garden Island and the marine nearshore environment (Figure 1, Appendix A).

1.2 Purpose & Objectives

The objective of the OMP is to assess the changes in the nature and extent of PFAS within the environment, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor associated with Defence's historical use of legacy Aqueous Film Forming Foam (AFFF).

The purpose of this PFAS OMP factual report is to provide an up-to-date status of the condition of the site as it is currently understood in relation to the most recent sampling event.

The objectives of the report are:

> To provide a succinct summary of the Q4 2020 sampling event and provision of analytical results with supporting tables and figures.

> To provide confirmation of the current understanding of risk.

> To provide supporting data for the assessment of management actions, where relevant.

1.3 Relevant Guidelines

This assessment has been undertaken in general accordance with applicable industry standards for a site investigation for the purpose, objectives and scope identified in this report. These standards are set out in:

> National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013) (ASC NEPM).

> Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, PFAS National Environmental Management Plan (NEMP) 2.0.

> Australian Standard AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds.

> Standards Australia 1998. AS/NZ 5667:1998 Water quality – sampling.

> Australian and New Zealand Guidelines, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

> Department of Environment and Regulation (DER), 2014, Assessment and Management of Contaminated Sites[1].

[1] It is noted that Site is located on Commonwealth Land and is regulated under the Commonwealth environmental legislation, the State based DWER guidelines are relevant for the sampling of off-Site private properties and waterways.

> Department of Defence, Department of Energy, 2018, Quality System Manual Schedule B15.
> U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
> USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.
> National Health and Medical Research Council (NHMRC), August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.

2 Scope of Work

Cardno carried out the tasks detailed in the following sections in order to satisfy the purpose and objectives of this assessment.

2.1 Groundwater Monitoring

Sampling of selected groundwater bores was performed in accordance with the SAQP (Cardno, 2019), applying methods set out in section 3 of this report. The groundwater bores monitored as part of the OMP are presented in Table 2-1, and are shown on Figure 2, Appendix A.

Table 2-1 Groundwater Monitoring Locations

Monitoring Area	Location ID
Demolition Ground	MW137, MW139, MW141, MW142, MW147, MW149, MW272
Fire Training Area	MW109, MW112, MW117, MW120, MW121, MW123, MW124, MW125, MW126, MW127, MW128
WWTP	MW158, MW161, MW166, MW171, MW172, MW173, MW193, MW196, MW197, MW199, MW200, MW202, MW203, MW195D, MW195S
Accommodation Area	MW288, MW289
Dredge Spoil / Careening Bay	MW264, MW268, MW269
AVCAT Storage and Fuel Farm	MW233, MW236, MW238, MW239, MW240, MW242, MW243, MW245, MW516, MW248, MW249
Fire Station, Flammable / Hazardous Goods and Waste Storage, Ship Sullage	MW255, MW256, MW257, MW258, MW259, MW261, MW010*, MW517, MW518,
Helicopter Support Facility	MW214, MW215, MW216, MW217, MW220, MW224, MW225, MW226, MW227, MW228, MW282

Note: *MW010 was sampled as the replacement groundwater bore for MW262 which was reported as destroyed

2.2 Porewater, Surface Water and Sediment Monitoring

Porewater, sediment and surface water sampling were performed in accordance with the SAQP (Cardno, 2019), applying methods set out in section 3 of this report. The porewater, surface water and sediment monitoring locations monitored as part of the OMP are presented in Table 2-2, and are shown on Figures 3 to 5, Appendix A.

Table 2-2 Porewater, Surface Water and Sediment Monitoring Locations

Monitoring Area	Porewater Sampling Location ID	Sediment Sampling Location ID	Surface Water Sampling Location ID
Demolition Ground	PW329, PW330, PW331, PW356, PW357, PW358	SD329, SD330, SD331, SD356, SD357, SD358	SW150, SW152, SW154, SW156
Fire Training Area	PW335, PW340, PW341, PW362, PW363, PW364	SD335, SD340, SD341, SD362, SD363, SD364	SW130, SW132, SW134
WWTP	PW304, PW345, PW367, PW368, PW369, PW350, PW351, PW352, PW380, PW381, PW401	SD304, SD345, SD367, SD368, SD369, SD350, SD351, SD352, SD380, SD381, SD401	SW305, SW370, SW371, SW372, SW373, SW353, SW382, SW383, SW384
Accommodation Area	PW346	SD346	
Dredge Spoil / Careening Bay	PW374, PW375, PW378	SD374, SD375, SD378	SW317, SW318, SW319
Helicopter Support Facility	PW306, PW307, PW308, PW314, PW315, PW316, PW405, PW407, PW409, PW411, PW413, PW415	SD306, SD307, SD308, SD314, SD315, SD316, SD405, SD407, SD409, SD411, SD413, SD415	SW309, SW310, SW311, SW406, SW408, SW410, SW412, SW414, SW416

2.3 Data Management

All the data included in the report has been collected, uploaded to the ESdat database and reviewed according to the data management requirements of the DCMM Annex L.

The sample naming convention detailed in the DCMM Annex L was used in the field.

2.3.1 Defence ESdat database

Data collected as part of the Q4 2020 OMP monitoring event was uploaded to the ESdat database according to the data management requirements of the DCMM Annex L, including:

- All field data collected was uploaded;
- Laboratory data was uploaded and approved; and
- QA/QC data was reconciled.

2.4 Deviations from the OMP SAQP

Deviations from the SAQP for the Q4 2020 monitoring event are presented in Table 2-3 below.

Table 2-3 Deviations from OMP SAQP

Location	Deviation	Comments
MW128, MW147, MW172, MW173, MW197, MW214, MW215, MW220, MW225, MW258, MW288	Not sampled	These wells were found dry during this monitoring event.
MW123, MW166, MW196, MW236, MW248, MW249	Sampled with disposable HPDE bailer	The hydrasleeve at these locations didn't fill up with water during recovery.
MW202, MW216	Sampled with disposable HPDE bailer	Hydrasleeve was damaged or broken during sampling.

3 Methodology

3.1 Groundwater Sampling Methodology

Groundwater monitoring was undertaken by no purge HydraSleeve® method as detailed in Table 3-1.

Table 3-1 Groundwater Sampling Method

Activity	Details
Well Gauging	Standing Water Level (SWL) were gauged using an interface probe. All wells were measured against a specified mark at the top of the well casing.
Groundwater Field Parameters	Groundwater field parameters were recorded via a down-hole water quality meter (positioned within the mid screen interval) prior to deployment of HydraSleeves® or pre-sample collection. The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Once field parameters have stabilised (as indicated by at least three consecutive measurements falling within +/- 10% of each other) measurement were recorded on field data records. All field instruments (e.g. water quality meter) were calibrated by the equipment supplier to optimise the accuracy of the measurements taken. Calibration certificates are provided in Appendix D.
Deployment of HydraSleeve	HydraSleeve were deployed with top weight sample for collection to begin at the lowest point. Following sampling, hydrasleeves were deployed in preparation for the next OMP monitoring event using the same string for consistency (same depth of sampling i.e. within screen depth).
Retrieval of HydraSleeves (Sample Collection)	HydraSleeve sampling devices were left in wells for a minimum of 12 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples were collected via continuous pull method at a rate allowing the water to pass through the check value into the sample sleeve. Samples were discharged immediately (minimise changes in chemistry) via discharge tube.
Hand bailing	Disposable HDPE hand bailers, attached to a polypropylene string, were used at wells where the water column wasn't sufficient to fill the hydrasleeve. Purging of the well was undertaken prior to sampling to make sure that a sample representative of the aquifer is taken.
Decontamination procedure	Dedicated HydraSleeves were used at each groundwater bore thus removing the need for decontamination. All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	Groundwater samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance). ▪ TOC, TSS, TDS and pH. The primary laboratory was ALS Global Laboratories (Perth), and the secondary laboratory (quality control) was Eurofins (Perth). Both laboratories are NATA-accredited for the

Activity	Details
	parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.

3.2 Porewater and Sediment Sampling Methodology

The methodologies for sediment and porewater sampling are detailed in Table 3-2 and Table 3-3 respectively.

Table 3-2 Sediment Sampling Methodology

Item	Details
Sample Collection	Sediment samples were collected at the sediment/water interface using hand tools (e.g. trowel, hand auger, PVC pipe etc.) with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under CoC documentation.
Field Parameters	At each sampling location, the sediment sample was visually assessed and observations (including physical description) were recorded on field data sheets.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Laboratory Testing	Sediment samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ TOC, EC, CEC and pH

Table 3-3 Porewater Sampling Methodology

Item	Detail
Porewater Sample Collection	Porewater sampling was undertaken in accordance with the USEPA guidance *Operating Procedure Pore Water Sampling*. Porewater was purged and sampled at less than 1 L per minute using a peristaltic pump, connected to a stainless steel tube with a screened section at its base (Drive-Point Piezometer). The porewater sampler was inserted to at least 1 m below the surficial marine sediments, to ensure collection of pore water rather than surface water.
Field parameters	The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation, transport and holding times.	As detailed in Table 3-1.
Laboratory Testing	Porewater samples were submitted for the same analysis as groundwater samples (refer to Table 3-1).

3.3 Surface Water Sampling Methodology

The methodology for the surface water monitoring is detailed in Table 3-4.

Table 3-4 Surface water Sampling Methodology

Item	Details
Field parameters	The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Field observations such as odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Surface water samples were collected directly into sample containers using a 'Grab' (manual) sample method via a long-handled sampling device. The sample container was positioned at least 10 cm below the surface water level and above the sediment bed and oriented with the capped opening facing downwards to avoid the collection of surface films. Samples were decanted into the laboratory supplied sample containers. Samples were collected in accordance with Australian/New Zealand Standards (AS/NZS 5667.1:1998) '*Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*'.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation, transport and holding times.	As detailed in Table 3-1.
Laboratory Testing	Surface water samples were submitted for the same analysis as groundwater samples (refer to Table 3-1).

3.4 Quality Control / Quality Assurance

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following data quality indicators, as described in the SAQP:

> QA documentation.

> Bias.

> Data Representativeness.

> Data Precision & Accuracy.

> Laboratory Performance.

> Data Comparability.

> Data Set Completeness.

A detailed review of these aspects has been undertaken, the results of which are presented in Appendix E. The QA/QC review concluded that there are no significant systematic errors in the data collection process and therefore, the dataset used for the assessment is considered valid and complete.

3.5 Assessment Criteria

3.5.1 Groundwater, Porewater and Surface Water

The adopted assessment criteria for groundwater, porewater and surface water are detailed in Table 3-5.

Table 3-5 Criteria for Groundwater, Porewater and Surface Water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	µg/L		
Human Health - Drinking Water Quality Guideline	0.07[1]	0.56	HEPA 2020
Human Health – Recreational Water	2[1]	10	NHMRC 2019
Ecological – 99% species protection	0.00023[2]	19	HEPA 2020

Notes:

1. Sum of PFOS and PFHxS.
2. PFOS only; The criterion of 0.00023 µg/L is lower than the laboratory level of reporting (LOR), however, the PFAS NEMP 2020 allows for the adoption of the laboratory LOR as a screening level rather than a quantified measurement.

3.5.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment. Sediment will be assessed against the NEMP (HEPA, 2020) soil criteria for consistency with the SAQP (Cardno, 2019), DSI (RPS, 2018b) and ERA (RPS, 2018c). The adopted assessment criteria for sediments are detailed in Table 3-6.

Table 3-6 Criteria for Sediment

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	mg/kg		
Human Health - Commercial / industrial (on-base activities)	20[1]	50	HEPA 2020
Ecological - Open space – direct exposure (interim guidelines)	1[2]	10	HEPA 2020
Ecological - Industrial /Commercial – indirect exposure (interim guidelines) (on site)	0.01[2]	-	HEPA 2020

Notes:

1. Sum of PFOS and PFHxS.
2. PFOS only

4 Field Observations and Results

4.1 Groundwater

4.1.1 Summary of Field Observations

No weather event or Site activities that could have impacted the sampling or results were observed.

4.1.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the groundwater sampling event are presented in Table D1, Appendix D. Parameters were generally consistent with the previous monitoring event. Groundwater pH was near neutral, water was mostly clear and fresh to saline. DO readings indicate aerobic groundwater conditions. No visual or olfactory evidence of contamination were recorded.

4.1.1.2 Groundwater Elevation and Migration

Groundwater gauging data and reduced water levels (RWL) are provided within the field records (Table D1) in Appendix D. The groundwater elevations ranged between 0.029 mAHD (MW226) and 1.186 mAHD (MW268). It is expected that groundwater levels and migration are locally and temporally influenced by the tides. The exact impact of tidal pressure on groundwater elevation and wells affected are unknown. Gauging time was recorded to account for this potential tidal influence when inferring the groundwater contours.

Groundwater flow was interpreted to be radial from the site where mounding of groundwater is occurring (i.e. groundwater flows towards the ocean), consistent with the previous monitoring events. Groundwater inferred elevation contours for the 2020 Q4 monitoring event are shown in Figure 6, Appendix A.

4.1.2 Groundwater Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-1. Laboratory results have also been compared to available historical data. Figure 2 in Appendix A presents the groundwater monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Tabulated results are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-1 Summary of Groundwater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	MW112, MW117, MW141, MW236, MW282	0.56[3]	5.77 (MW282)	58	5
Sum of PFHxS and PFOS	MW010, MW109, MW112, MW117, MW120, MW121, MW123, MW125, MW141, MW142, MW161, MW166, MW171, MW193, MW216, MW228, MW233, MW236, MW240, MW245, MW248, MW249, MW255, MW256, MW259, MW261, MW264, MW268, MW269, MW282, MW289, MW516	0.07[3]	85.3 (MW282)	58	32
PFOS	MW010, MW109, MW112, MW117, MW120, MW121, MW123, MW141, MW142, MW161, MW166, MW171, MW193, MW202, MW216, MW217, MW233, MW236, MW242, MW243, MW245, MW248, MW249, MW255, MW256, MW259, MW264, MW269, MW282, MW289, MW516, MW517	0.01[4]	44.1 (MW282)	58	32

Notes:

1. Non-inclusive of quality control samples
2. NHMRC 2019 guideline value for human health – Surface Water Recreational
3. HEPA 2020 guideline value for human health – drinking water

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria

4. HEPA 2020 guideline value for ecological – 99% species protection (LOR adopted)

Findings are summarised as follows:

- Two groundwater sampling locations (MW228, MW010) reported a first exceedance of the drinking water criteria (0.07 µg/L) for Sum of PFOS and PFHxS. However, one of these locations (MW010) is a replacement bore for the previously sampled bore MW262, which had exceeded guideline values for the drinking water criteria for Sum of PFOS and PFHxS in the past.
- No first time detection of PFOA or Sum of PFOS and PFHxS was reported for the groundwater monitoring locations.

4.2 Porewater

4.2.1 Summary of Field Observations

4.2.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the porewater sampling program are presented in Table D1, Appendix D. Parameters were generally consistent with the previous monitoring event. Porewater pH was near neutral, water was clear and saline to hyper saline. DO readings indicate aerobic porewater conditions. No visual or olfactory evidence of contamination were recorded.

4.2.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-2. Laboratory results have also been compared to available historical data. Figure 4 in Appendix A presents the porewater monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Tabulated results are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-2 Summary of Porewater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	0.56[3]	0.08 (PW369)	39	0
Sum of PFHxS and PFOS	PW316, PW346, PW367, PW369	0.07[3]	3.16 (PW346)	39	4
PFOS	PW304, PW316, PW340, PW341, PW345, PW346, PW364, PW367, PW368, PW369, PW375, PW378, PW405, PW415	0.01[4]	2.71 (PW346)	39	14

Notes:

1. Non-inclusive of quality control samples
2. NHMRC 2019 guideline value for human health - Surface Water Recreational
3. HEPA 2020 guideline value for human health – drinking water
4. HEPA 2020 guideline value for ecological – 99% species protection (LOR adopted)

- Two porewater sampling locations (PW405, PW415) reported a first exceedance of the ecological 99% species protection guidelines (0.01 µg/L adopted) for PFOS. These two sampling locations also reported a first-time detection for Sum of PFOS and PFHxS.
- One porewater sampling location (PW316) reported a first exceedance of the drinking water criteria (0.07 µg/L) for Sum of PFOS and PFHxS. This location had previously reported a detectable concentration of Sum of PFOS and PFHxS above LOR.

4.3 Surface water

4.3.1 Summary of Field Observations

4.3.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the surface water sampling program are presented in field sampling record sheets, summarised in Table D2, Appendix D. Parameters were generally consistent with the previous monitoring event. Surface water pH was near neutral, water was clear and hyper-saline. DO readings indicate aerobic surface water conditions. No visual or olfactory evidence of contamination were recorded.

4.3.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-3. Laboratory results have also been compared to available historical data. Figure 3 in Appendix A presents the surface water monitoring locations where a first time detection of Sum of PFOS and PFHxS or PFOA or a new exceedance of guideline values were reported. Tabulated results are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-3 Summary of surface water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	0.56[3]	<0.01	28	0
Sum of PFHxS and PFOS	SW305, SW371	0.07[3]	0.31 (SW371)	28	2
PFOS	SW305, SW370, SW371, SW372, SW373	0.01[4]	0.31 (SW371)	28	5

Notes:

1. Non-inclusive of quality control samples
2. NHMRC 2019 guideline value for human health - Surface Water Recreational
3. HEPA 2020 guideline value for human health – drinking water
4. HEPA 2020 guideline value for ecological – 99% species protection (LOR adopted)

Findings are summarised as follows:

- Two surface water sampling locations (SW305 and SW371) reported a first exceedance of the drinking water criteria (0.07 µg/L) for Sum of PFOS and PFHxS. These locations had previously reported detectable concentrations of Sum of PFOS and PFHxS above LOR.
- No first time detection of PFOA or Sum of PFOS and PFHxS was reported for the surface water monitoring locations.

4.4 Sediment

4.4.1 Summary of Field Observations

Observations recorded during the sediment sampling program are provided in Table D3, Appendix D. Sediment was described as generally white/grey coarse sand with no visual or olfactory evidence of contamination.

4.4.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. Soil criteria are adopted in the absence of criteria for sediment for consistency with the SAQP (Cardno, 2020), DSI (RPS, 2018b) and ERA (RPS, 2018c). A summary of results exceeding the adopted criteria is presented in Table 4-4. Laboratory results have also been compared to available historical data. Figure 5 in Appendix A presents the sediment monitoring locations. Tabulated results are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-4 Summary of Sediment Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (mg/kg)	Max Conc. (mg/kg)	No. Analytical Results[4]	No. Results Above Criteria
PFOA	-	10[1]	<0.0002	39	0
Sum of PFHxS and PFOS	-	20[3]	0.0096 (SD346)	39	0
PFOS	-	0.01[2]	0.0094 (SD346)	39	0

Notes:

1. Ecosystems – open space – direct exposure
2. Ecological - indirect exposure
3. Human health – comm/industrial
4. Non-inclusive of quality control samples

Findings are summarised as follows:

- One sediment sampling location (SD367) reported a first time detect of Sum of PFOS and PFHxS above the laboratory LOR but below the human health and ecological criteria.

4.5 Changes to the Monitoring Network Condition

The following change to the monitoring network were observed:

- MW010 was sampled as the replacement bore for MW262 which was previously destroyed.
- MW128, MW172, MW214, MW215, MW220, MW225 and MW258 are consistently found dry and should be decommissioned or replaced.
- MW147, MW173, MW197 and MW288 are seasonally found dry.
- Hydrasleeve sampling devices didn't fill up during recovery in a number of wells due to insufficient water column. Alternative sampling method (hand bailer) were used in these instances (refer to Table D1, Appendix D).

No other change to the monitoring condition that could have impacted the data integrity was recorded.

5 Summary and Conclusions

Cardno undertook the 2020 Q4 groundwater, porewater, surface water and sediment monitoring event at HMAS Stirling as part of the PFAS OMP. Groundwater sampling and testing was undertaken at 58 monitoring bores, 28 surface water locations and 39 sediment and porewater sampling locations. Eleven monitoring wells could not be sampled as the wells were found dry.

Groundwater levels were gauged in all wells before sampling. Groundwater flow was interpreted to be radial from the site where mounding of groundwater is occurring (i.e. groundwater flows towards the ocean), consistent with the previous monitoring event.

The groundwater laboratory results reported the following:

- Of the 58 samples that were tested, PFOA (5 samples), PFOS (32 samples) and Sum of PFHxS and PFOS (32 samples) reported concentrations that exceeded adopted assessment criteria.
- Two groundwater sampling locations (MW228, MW010) reported a first exceedance of the drinking water criteria (0.07 µg/L) for Sum of PFOS and PFHxS. However, one of these locations (MW010) is a replacement for the previously sampled bore (MW262) which had exceeded guideline values for the drinking water criteria for Sum of PFOS and PFHxS in the past.

The surface water laboratory results reported the following:

- Of the 28 samples tested, PFOS (5 samples) was detected above the adopted ecological 99% species protection criteria and Sum of PFHxS and PFOS (2 samples) reported concentrations that exceeded the drinking water criteria.
- Two surface water sampling locations (SW305 and SW371) reported a first exceedance of the drinking water criteria (0.07 µg/L) for Sum of PFOS and PFHxS. These locations had previously reported detectable concentrations of Sum of PFOS and PFHxS above LOR

The porewater laboratory results reported the following:

- Of the 39 samples that were tested, PFOS (14 samples) and Sum of PFOS and PFHxS (4 sample) reported concentrations above adopted assessment criteria.
- Two porewater sampling locations (PW405, PW415) reported a first exceedance of the ecological 99% species protection guidelines (0.01 µg/L) for PFOS. These two sampling locations also reported a first-time detection for Sum of PFOS and PFHxS.
- One porewater sampling location (PW316) reported a first exceedance of the drinking water criteria (0.07 µg/L) for Sum of PFOS and PFHxS. This location had previously reported a detectable concentration of Sum of PFOS and PFHxS above LOR once before.

The sediment laboratory results reported the following:

- Of the 39 samples that were tested, none reported concentrations above adopted assessment criteria for PFOA, PFOS or PFOS and PFHxS.
- One sediment sampling location (SD367) reported a first time detect of Sum of PFOS and PFHxS above the laboratory LOR but below the human health and ecological criteria

The following recommendation is made:

- Groundwater monitoring wells MW128, MW172, MW214, MW215, MW220, MW225 and MW258 are consistently found dry and should be either decommissioned or replaced following a review of the OMP monitoring network.

The SAQP will be reviewed prior to the next monitoring event including:

- Bore details (ID, bore depth and screen interval).
- Field record keeping (daily equipment calibration, purged parameters).
- Methodology (hydrasleeve installation time, QA/QC).

The next OMP sampling event for HMAS Stirling will be the quarterly monitoring event (Q1 2021), scheduled for March 2021. An Annual Interpretive Report will be prepared following the September 2021 monitoring event for the 2020 –2021 reporting period.

6 References

General References

1. Australian Standard AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 – Non-volatile and semi-volatile compounds.
2. Australian Standard AS 4482-1999 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 2 – Volatile substances.
3. Australian Water Quality Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ, 2000).
4. *Contaminated Sites Act 2003*, Western Australia.
5. Department of the Environment and Energy (2017) in the National Greenhouse and Energy Reporting Scheme Measurement Technical Guidelines for the Estimation of Emissions by Facilities in Australia.
6. Department of Environment Regulation (DER), 2014, *Assessment and Management of Contaminated Sites*.
7. Department of Water and Environment Regulation (DWER), 2018, Perth Groundwater Atlas, (https://maps.water.wa.gov.au/#/webmap/gwm).
8. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, '*Guidance on Environmental Data Verification and Data Validation'.*
9. The Heads of EPAs Australia and New Zealand (HEPA; 2020) PFAS National Environmental Management Plan (NEMP) 2.0, January 2020.
10. National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended), registered May 2013.
11. National Health and Medical Research Council (NHMRC) (2011 – updated 2018) National Water Quality Management Strategy Australian Drinking Water Guidelines 6, August 2018
12. NHMRC, August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.
13. Standards Australia/Standards New Zealand (1998) AS5667.1:1998 *'Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples'*.
14. U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
15. USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.

Site Specific References

16. Department of Defence, January 2019, HMAS Stirling Garden Island PFAS Management Area Plan, Final.
17. Cardno, 18 August 2020, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) HMAS Stirling'.
18. Cardno, 16 April 2020, PFAS OMP 2019 Q4 Quarterly Monitoring Factual Report, HMAS Stirling
19. Cardno, 14 May 2020, PFAS OMP 2020 Q1 Quarterly Sampling Event Factual Report, HMAS Stirling
20. Cardno, 23 September 2020, PFAS OMP 2020 Q2 Quarterly Sampling Event Factual Report
21. Cardno, 8 January 2020, PFAS OMP 2020 Q3 Quarterly Sampling Event Factual Report
22. RPS, October 2018, HMAS Stirling - PFAS Ongoing Monitoring Plan, Ref. EEC16094.005 (RPS, 2018a).
23. RPS, May 2018, Detailed Site Investigation – HMAS Stirling PFAS Investigation, Ref. EEC16094.003 (RPS, 2018b).
24. RPS, September 2018, HMAS Stirling Garden Island PFAS Investigation Ecological Risk Assessment. Ref. EEC16094.009 (RPS, 2018c).

APPENDIX

A

FIGURES

FIGURE 1

1:32,000 Scale at A3

Meters

0 500 1,000

Site Location

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-06-07 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-001_RegionalLocation 02.mxd
Aerial Imagery Supplied by Google Map

Notes:
DW: Human Health criteria for Drinking Water quality (HEPA, 2020)

MW124
MW125
MW112
MW117
MW128
MW120
MW123
MW126
MW121
MW127
MW158
MW161
MW166
MW172
MW173
MW171
MW195-S
MW195-D
MW196
MW197
MW199
MW200
MW193
MW203
MW202
MW288
MW289
MW233
MW236
MW238
MW239
MW240
MW242
MW243
MW245
MW249
MW256
MW257
MW248
MW516
MW255
MW264
MW261
MW258
MW259
MW518
MW010
MW269
MW268
MW217
MW220
MW227
MW214
MW216
MW226
MW224
MW282
MW225
MW215
MW228

MW010
PFOS+PFHxS>DW

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

Groundwater Results Summary

- No first detect or new exceedance (50)
- First time detect of PFOA or PFOS+PFHxS (0)
- New exceedance of guideline value (2)
- Not Sampled (10)

FIGURE 2A
1:12,500 Scale at A3
Meters
0 300 600

Groundwater Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-002A_2020Q4_GWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Map & Nearmap

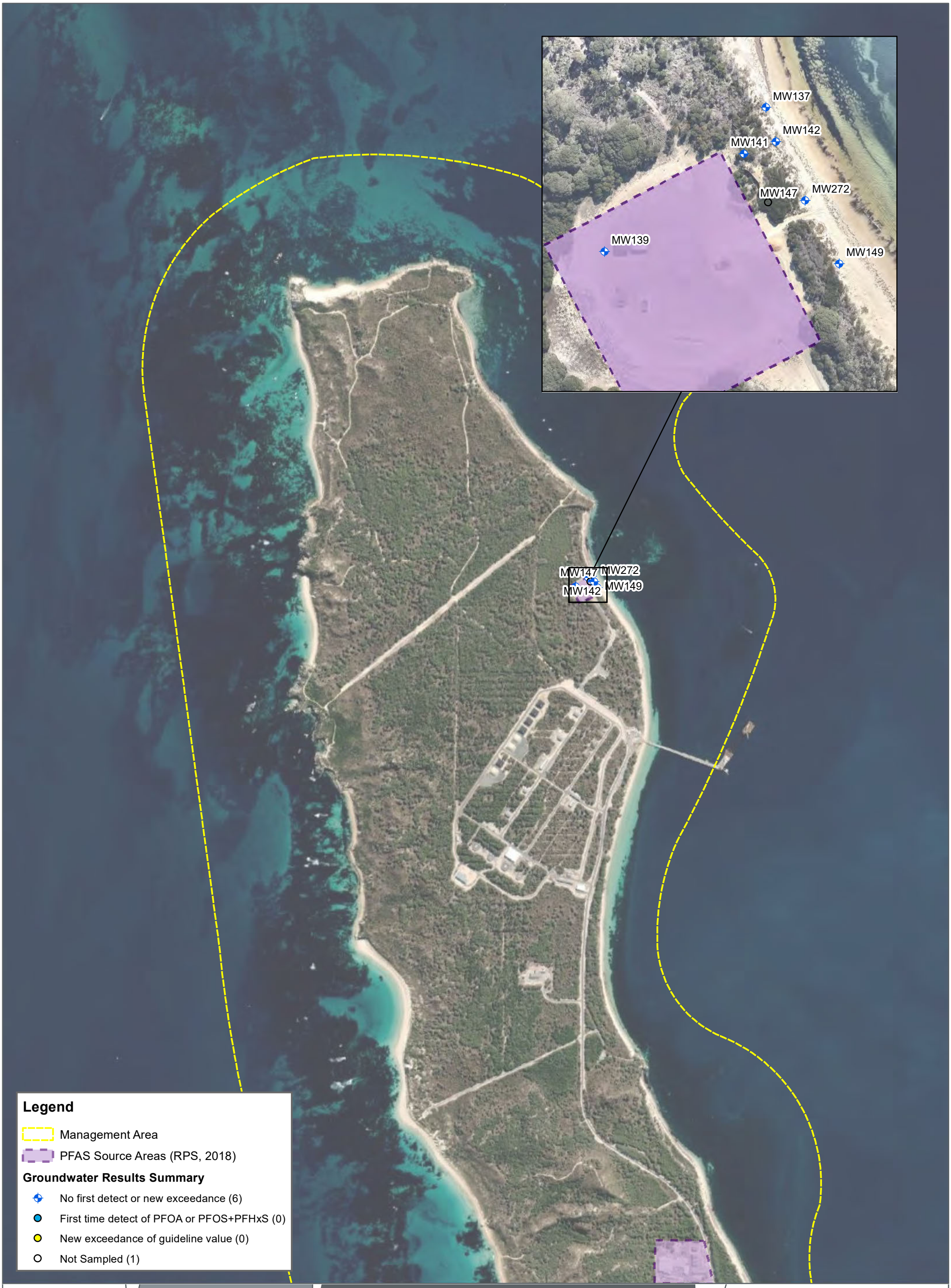

FIGURE 2B

1:15,000 Scale at A3

Groundwater Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-002B_2020Q4_GWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

Notes:
DW: Human Health criteria for Drinking Water quality (HEPA, 2020)

SW130
SW132
SW134
SW353
SW384
SW383
SW382
SW370
SW371
SW305
SW373
SW372
SW317
SW318
SW319
SW406
SW408
SW410
SW412
SW414
SW416
SW309
SW310
SW311

SW371
PFOS+PFHxS>DW

SW305
PFOS+PFHxS>DW

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

Surface Water Results Summary

- No first time detect or new exceedance (22)
- First time detect of PFOA or PFOS+PFHxS (0)
- New exceedance of guideline value (2)

FIGURE 3A
1:15,000 Scale at A3
Meters
0 300 600

Surface water Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003A_2020Q4_SWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

SW150
SW152
SW154
SW156
SW152
SW150
SW156
SW154
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Surface Water Results Summary
No first time detect or new exceedance (4)
First time detect of PFOA or PFOS+PFHxS (0)
New exceedance of guideline value (0)
FIGURE 3B
1:15,000 Scale at A3
Meters
0
300
600
Surface water Results
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003B_2020Q4_SWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

Notes:
DW: Human Health criteria for Drinking Water quality (HEPA, 2020)
99%SP: Ecological criteria for 99% species protection (HEPA, 2020)

PW335
PW364
PW362
PW340
PW363
PW341
PW350
PW401
PW380
PW351
PW381
PW352
PW369
PW345
PW367
PW368
PW304
PW346
PW314
PW315
PW306
PW307
PW316
PW308
PW316
PFOS+PFHxS>DW
PW378
PW375
PW374
PW405
PFOS>%99SP
PW405
PW407
PW409
PW411
PW413
PW306
PW315
PW316
PW314
PW308
PW415
PW415
PFOS>%99SP

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

Pore water Results Summary

- No first detect or new exceedance (30)
- First time detect of PFOA or PFOS+PFHxS (0)
- New exceedance of guideline value (3)

FIGURE 4A

1:15,000Scale at A3

Meters

0 300 600

Porewater Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-004A_2020Q4_PWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

FIGURE 4B

1:15,000 Scale at A3

Meters

0 300 600

Porewater Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-004B_2020Q4_PWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

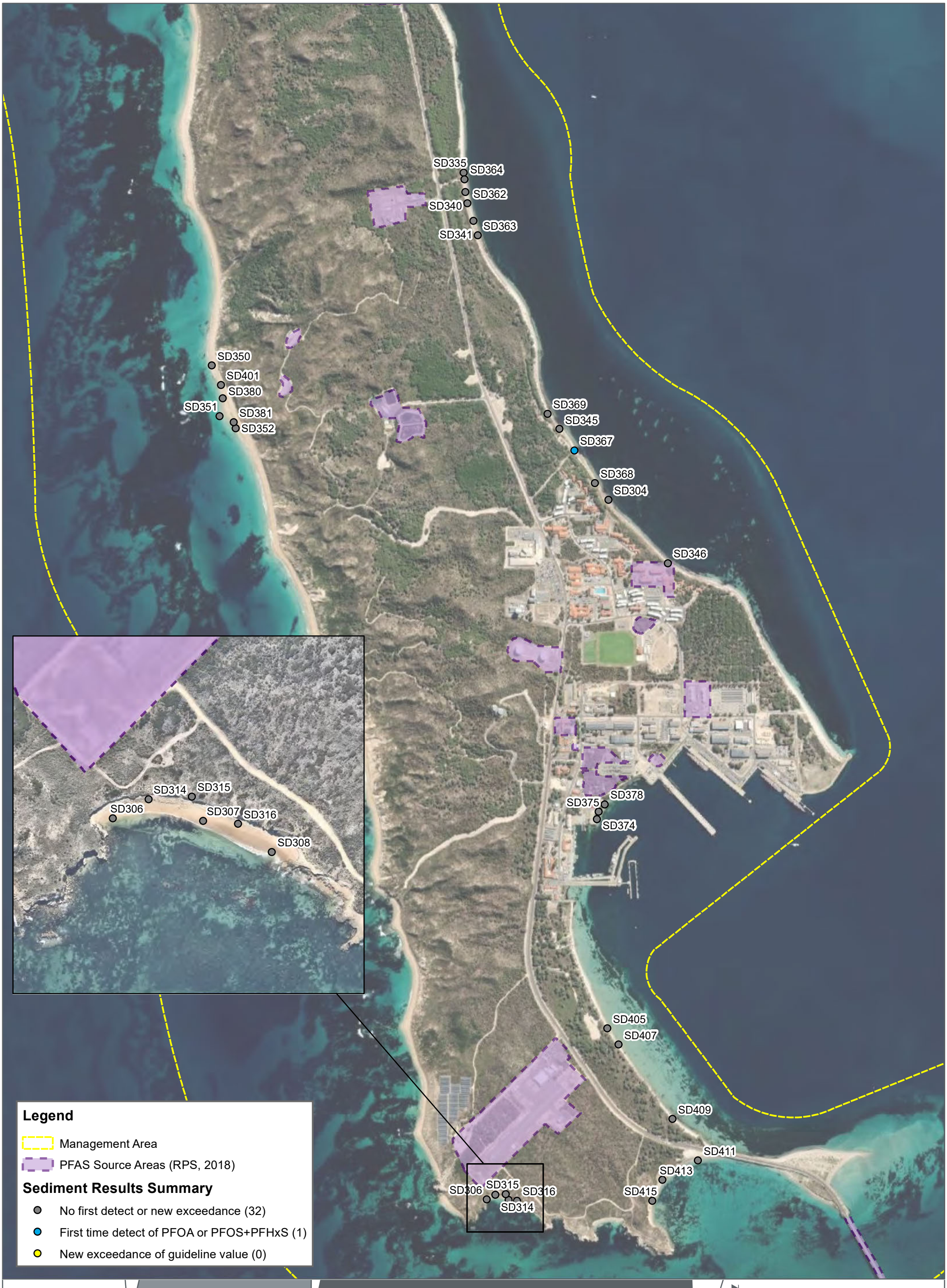

FIGURE 5A

1:15,000 Scale at A3

Meters

0 300 600

Sediment Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-005A_2020Q4_SDResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

SD356
SD331
SD357
SD330
SD358
SD329
SD331
SD356
SD358
SD357
SD330
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Sediment Results Summary
No first detect or new exceedance (6)
First time detect of PFOA or PFOS+PFHxS (0)
New exceedance of guideline value (0)
FIGURE 5B
1:15,000 Scale at A3
Meters
0
300
600
Sediment Results
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-005B_2020Q4_SDResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

FIGURE 6

1:32,000 Scale at A3

Meters

0 500 1,000

Inferred Groundwater Contours

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-006_2020Q4_GroundwaterContours 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

APPENDIX

B

DATA ASSESSMENT TABLES

Table 1: Water Analytical Results

					Perfluoroalkane Sulfonic Acids						Perfluoroalkane Carboxylic Acids										(n:2) Fluorotelomer Sulfonic Acids				Perfluor		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL					0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.02	0.05	0.02
Human Health - Drinking Water Quality Guideline															*0.56*													
Human Health – Recreational Water															10													
Ecological – 99% species protection									LOR*						19													
Monitoring Area	Lab Report Number	Field ID	Location Code	Date																								
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014092	0089_MW010_201216	MW010	16/12/2020	<0.02	<0.02	0.08	<0.02	0.02	<0.02	<0.1	0.03	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013984	0089_MW109_201214	MW109	14/12/2020	0.12	0.31	8.32	1.10	10.0	<0.02	0.1	1.31	0.22	0.15	0.48	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013984	0089_MW112_201214	MW112	14/12/2020	0.14	0.53	32.5	3.74	16.6	<0.02	0.2	2.86	0.41	0.54	*3.84*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.14	<0.05	<0.05	0.17	<0.05	<0.02
Fire Training Area	EP2013992	0089_MW117_201214	MW117	14/12/2020	0.39	0.73	10.2	1.46	31.8	<0.02	0.3	2.58	0.49	0.25	*0.70*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013984	0089_MW120_201214	MW120	14/12/2020	0.02	0.05	1.66	0.27	3.86	<0.02	<0.1	0.15	0.03	<0.02	0.12	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013992	0089_MW121_201214	MW121	14/12/2020	0.04	0.07	3.25	0.13	4.87	<0.02	<0.1	0.30	0.08	0.05	0.15	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013992	0089_MW123_201214	MW123	14/12/2020	0.08	0.05	0.17	<0.02	0.04	<0.02	<0.1	0.30	0.08	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013984	0089_MW124_201214	MW124	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013984	0089_MW125_201214	MW125	14/12/2020	0.09	0.08	0.38	<0.02	<0.01	<0.02	<0.1	0.08	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013984	0089_MW126_201214	MW126	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013984	0089_MW127_201214	MW127	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013975	0089_MW137_201214	MW137	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013983	0089_MW139_201214	MW139	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013975	0089_MW141_201214	MW141	14/12/2020	0.59	1.06	10.3	1.01	39.8	<0.02	0.2	9.09	1.04	0.31	*1.10*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013975	0089_MW142_201214	MW142	14/12/2020	0.05	0.11	3.21	0.11	2.40	<0.02	<0.1	1.27	0.11	0.04	0.24	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013983	0089_MW149_201214	MW149	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2013984	0089_MW158_201214	MW158	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2013992	0089_MW161_201214	MW161	14/12/2020	0.03	0.04	1.15	0.14	7.06	<0.02	<0.1	0.17	0.17	0.08	0.11	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2013984	0089_MW166_201214	MW166	14/12/2020	0.02	0.02	0.47	0.05	7.53	<0.02	<0.1	0.20	0.22	0.12	0.04	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2013992	0089_MW171_201214	MW171	14/12/2020	0.04	<0.02	0.06	<0.02	0.02	<0.02	<0.1	0.04	0.04	0.03	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2014087	0089_MW193_201216	MW193	16/12/2020	0.76	0.58	6.87	0.28	1.56	<0.02	0.2	1.43	0.27	0.12	0.33	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2014087	0089_MW195D_201216	MW195D	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2014087	0089_MW195S_201216	MW195S	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2014087	0089_MW196_201216	MW196	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2014087	0089_MW199_201216	MW199	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2014051	0089_MW200_201215	MW200	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2014087	0089_MW202_201216	MW202	16/12/2020	<0.02	<0.02	0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP	EP2014087	0089_MW203_201216	MW203	16/12/2020	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014041	0089_MW216_201215	MW216	15/12/2020	0.36	0.62	4.22	0.11	0.63	<0.02	0.8	2.88	4.78	0.37	0.26	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	1.32	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014041	0089_MW217_201215	MW217	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	0.3	2.44	2.12	0.51	0.23	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	<0.05	21.7	0.57	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014041	0089_MW224_201215	MW224	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014042	0089_MW226_201215	MW226	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014051	0089_MW227_201215	MW227	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014047	0089_MW228_201215	MW228	15/12/2020	0.31	0.13	0.11	<0.02	<0.01	<0.02	4.2	15.0	14.0	3.42	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.02
AVCAT Storage and Fuel Farm	EP2014041	0089_MW233_201215	MW233	15/12/2020	<0.02	<0.02	0.14	<0.02	0.11	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
AVCAT Storage and Fuel Farm	EP2014041	0089_MW236_201215	MW236	15/12/2020	0.30	0.63	14.9	0.37	42.6	<0.02	<0.1	0.93	0.16	0.38	*1.06*	<0.02	<0.02	2.08	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
AVCAT Storage and Fuel Farm	EP2014041	0089_MW238_201215	MW238	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
AVCAT Storage and Fuel Farm	EP2014041	0089_MW239_201215	MW239	15/12/2020	0.03	0.05	0.02	<0.02	<0.01	<0.02	<0.1	0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
AVCAT Storage and Fuel Farm	EP2014041	0089_MW240_201215	MW240	15/12/2020	<0.02	0.09	1.34	0.02	<0.01	<0.02	<0.1	0.11	<0.02	0.03	0.05	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
AVCAT Storage and Fuel Farm	EP2014041	0089_MW242_201215	MW242	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
AVCAT Storage and Fuel Farm	EP2014041	0089_MW243_201215	MW243	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
AVCAT Storage and Fuel Farm	EP2014041	0089_MW245_201215	MW245	15/12/2020	<0.02	<0.02	0.03	<0.02	0.15	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
AVCAT Storage and Fuel Farm	EP2014041	0089_MW248_201215	MW248	15/12/2020	0.17	0.15	0.99	0.03	0.47	<0.02	<0.1	0.18	<0.02	0.04	0.06	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
AVCAT Storage and Fuel Farm	EP2014041	0089_MW249_201215	MW249	15/12/2020	<0.02	<0.02	0.15	<0.02	0.15	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014106	0089_MW255_201216	MW255	16/12/2020	0.10	0.22	2.44	<0.02	0.94	<0.02	<0.1	0.31	0.07	0.12	0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Station, Flammable/Hazardous Goods and Waste St	EP2013975	0089_MW256_201214	MW256	14/12/2020	0.25	0.30	3.47	0.30	6.33	<0.02	0.1	1.34	0.33	0.11	0.29	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.19	<0.05	<0.05	0.03	<0.05	<0.02
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014106	0089_MW257_201216	MW257	16/12/2020	<0.02	<0.02	0.03	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014092	0089_MW259_201216	MW259	16/12/2020	<0.02	0.07	0.14	<0.02	0.37	<0.02	<0.1	0.20	0.11	0.03	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014087	0089_MW261_201216	MW261	16/12/2020	<0.02	<0.02	0.23	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Dredge Spoil / Careening Bay	EP2013975	0089_MW264_201214	MW264	14/12/2020	<0.02	<0.02	0.03	<0.02	1.38	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Dredge Spoil / Careening Bay	EP2013975	0089_MW268_201214	MW268	14/12/2020	0.03	0.04	0.20	<0.02	<0.01	<0.02	<0.1	0.03	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Dredge Spoil / Careening Bay	EP2013975	0089_MW269_201214	MW269	14/12/2020	0.04	0.06	0.30	<0.02	0.35	<0.02	<0.1	0.08	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013983	0089_MW272_201214	MW272	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014041	0089_MW282_201215	MW282	15/12/2020	3.29	7.16	41.2	4.76	44.1	<0.02	1.1	11.7	1.94	2.08	5.77	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Accomodation Area	EP2014042	0089_MW289_201215	MW289	15/12/2020	0.04	0.05	0.30	0.03	1.42	<0.02	<0.1	0.03	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
AVCAT Storage and Fuel Farm	EP2014087	0089_MW516_201216	MW516	16/12/2020	0.08	0.09	1.38	0.12	5.15	<0.02	<0.1	0.16	<0.02	0.02	0.09	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014041	0089_MW517_201215	MW517	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02

Table 1: Water Analytical Results

					Perfluoroalkane Sulfonic Acids						Perfluoroalkane Carboxylic Acids										(n:2) Fluorotelomer Sulfonic Acids				Perfluor		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL					0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.02	0.05	0.02
Human Health - Drinking Water Quality Guideline															*0.56*													
Human Health – Recreational Water															10													
Ecological – 99% species protection									LOR*						19													
Monitoring Area	Lab Report Number	Field ID	Location Code	Date																								
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014092	0089_MW518_201216	MW518	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (East)	EP2014048	0089_PW304_201215	PW304	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014048	0089_PW306_201215	PW306	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014053	0089_PW307_201215	PW307	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014053	0089_PW308_201215	PW308	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014048	0089_PW314_201215	PW314	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014048	0089_PW315_201215	PW315	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014053	0089_PW316_201215	PW316	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.10	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013973	0089_PW329_201214	PW329	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013989	0089_PW330_201214	PW330	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013973	0089_PW331_201214	PW331	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013985	0089_PW335_201214	PW335	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013988	0089_PW340_201214	PW340	14/12/2020	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013988	0089_PW341_201214	PW341	14/12/2020	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (East)	EP2014053	0089_PW345_201215	PW345	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Accomodation Area	EP2014044	0089_PW346_201215	PW346	15/12/2020	0.07	0.07	0.45	0.03	2.71	<0.02	<0.1	0.10	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (West)	EP2014090	0089_PW350_201216	PW350	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (West)	EP2014090	0089_PW351_201216	PW351	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (West)	EP2014090	0089_PW352_201216	PW352	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013973	0089_PW356_201214	PW356	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013989	0089_PW357_201214	PW357	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013989	0089_PW358_201214	PW358	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013988	0089_PW362_201214	PW362	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013988	0089_PW363_201214	PW363	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.25	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013985	0089_PW364_201214	PW364	14/12/2020	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (East)	EP2014048	0089_PW367_201215	PW367	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.13	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (East)	EP2014048	0089_PW368_201215	PW368	15/12/2020	<0.02	<0.02	0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (East)	EP2014053	0089_PW369_201215	PW369	15/12/2020	<0.02	<0.02	0.09	<0.02	0.60	<0.02	<0.1	0.05	<0.02	0.02	0.08	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	0.05	<0.05	<0.02	<0.05	<0.02
Dredge Spoil / Careening Bay	EP2013989	0089_PW374_201214	PW374	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Dredge Spoil / Careening Bay	EP2013989	0089_PW375_201214	PW375	14/12/2020	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Dredge Spoil / Careening Bay	EP2013989	0089_PW378_201214	PW378	14/12/2020	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (West)	EP2014090	0089_PW380_201216	PW380	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (West)	EP2014104	0089_PW381_201216	PW381	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (West)	EP2014090	0089_PW401_201216	PW401	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014048	0089_PW405_201215	PW405	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014053	0089_PW407_201215	PW407	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014044	0089_PW409_201215	PW409	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014044	0089_PW411_201215	PW411	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014044	0089_PW413_201215	PW413	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014044	0089_PW415_201215	PW415	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013985	0089_SW130_201214	SW130	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	0.09	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013988	0089_SW132_201214	SW132	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Fire Training Area	EP2013988	0089_SW134_201214	SW134	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013973	0089_SW150_201214	SW150	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013973	0089_SW152_201214	SW152	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013989	0089_SW154_201214	SW154	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Demolition Ground	EP2013989	0089_SW156_201214	SW156	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (East)	EP2014048	0089_SW305_201215	SW305	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.13	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014048	0089_SW309_201215	SW309	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014048	0089_SW310_201215	SW310	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014053	0089_SW311_201215	SW311	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Dredge Spoil / Careening Bay	EP2013989	0089_SW317_201214	SW317	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Dredge Spoil / Careening Bay	EP2013989	0089_SW318_201214	SW318	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Dredge Spoil / Careening Bay	EP2013989	0089_SW319_201214	SW319	14/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (West)	EP2014090	0089_SW353_201216	SW353	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (East)	EP2014053	0089_SW370_201215	SW370	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (East)	EP2014048	0089_SW371_201215	SW371	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.31	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (East)	EP2014044	0089_SW372_201215	SW372	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (East)	EP2014044	0089_SW373_201215	SW373	15/12/2020	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (West)	EP2014104	0089_SW382_201216	SW382	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (West)	EP2014090	0089_SW383_201216	SW383	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
WWTP (West)	EP2014090	0089_SW384_201216	SW384	16/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014048	0089_SW406_201215	SW406	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014053	0089_SW408_201215	SW408	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014044	0089_SW410_201215	SW410	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014044	0089_SW412_201215	SW412	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014044	0089_SW414_201215	SW414	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Helicopter Support Facility	EP2014044	0089_SW416_201215	SW416	15/12/2020	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

*LOR value adopted for PFOS

Table 1: Water Analytical Results

					oalkyl Sulfonamides				PFAS			Inorganics																
					N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)_	Sum of PFHxS and PFOS	Sum of PFAS	Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Calcium (filtered)	Chloride	Ionic Balance	Magnesium (filtered)	pH (Lab)	Potassium (filtered)	Sodium (filtered)	Sulphate as SO4 - Turbidimetric (filtered)	TDS	TOC	Total Suspended Solids
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	mg/L	%	mg/L	pH Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL					0.05	0.05	0.02	0.05	0.01	0.01	0.01	1	1	1	1	0.01	0.01	1	1	0.01	1	0.01	1	1	1	10	1	5
Human Health - Drinking Water Quality Guideline										*0.07*																	
Human Health – Recreational Water										2																	
Ecological – 99% species protection																											
Monitoring Area	Lab Report Number	Field ID	Location Code	Date																								
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014092	0089_MW010_201216	MW010	16/12/2020	<0.05	<0.05	<0.02	<0.05	0.13	*0.10*	0.13	<1	451	<1	451	28.0	24.9	112	600	5.72	65	7.81	24	308	98	1,440	11	48
Fire Training Area	EP2013984	0089_MW109_201214	MW109	14/12/2020	<0.05	<0.05	<0.02	<0.05	20.7	*18.3*	22.1	<1	278	<1	278	7.34	7.23	89	44	0.76	16	7.95	3	32	26	412	14	127
Fire Training Area	EP2013984	0089_MW112_201214	MW112	14/12/2020	<0.05	<0.05	<0.02	<0.05	57.2	*49.1*	61.7	<1	241	<1	241	6.32	5.47	73	34	7.14	10	7.92	2	22	26	344	11	250
Fire Training Area	EP2013992	0089_MW117_201214	MW117	14/12/2020	<0.05	<0.05	<0.02	<0.05	46.8	*42.0*	49.0	<1	408	<1	408	9.76	10.7	160	34	4.67	19	7.89	3	25	31	525	15	222
Fire Training Area	EP2013984	0089_MW120_201214	MW120	14/12/2020	<0.05	<0.05	<0.02	<0.05	5.84	*5.52*	6.16	<1	228	<1	228	6.06	5.92	67	37	1.18	15	7.97	3	29	22	348	8	105
Fire Training Area	EP2013992	0089_MW121_201214	MW121	14/12/2020	<0.05	<0.05	<0.02	<0.05	8.74	*8.12*	8.94	<1	235	<1	235	6.37	7.29	95	44	6.71	16	8.19	4	26	21	325	8	62
Fire Training Area	EP2013992	0089_MW123_201214	MW123	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.67	*0.21*	0.72	<1	231	<1	231	15.5	14.9	97	354	2.13	32	8.02	12	163	44	757	14	643
Fire Training Area	EP2013984	0089_MW124_201214	MW124	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	359	<1	359	504	544	516	16,000	3.85	1,280	7.60	498	9,200	2,170	28,100	16	269
Fire Training Area	EP2013984	0089_MW125_201214	MW125	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.55	*0.38*	0.63	<1	342	<1	342	507	578	536	16,100	6.60	1,380	7.59	531	9,760	2,200	29,700	15	236
Fire Training Area	EP2013984	0089_MW126_201214	MW126	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	485	<1	485	472	522	505	15,000	5.08	1,290	7.51	461	8,710	1,860	26,500	9	156
Fire Training Area	EP2013984	0089_MW127_201214	MW127	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	470	<1	470	465	528	467	14,800	6.26	1,320	7.61	470	8,820	1,850	25,500	18	124
Demolition Ground	EP2013975	0089_MW137_201214	MW137	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	444	<1	444	589	673	597	18,500	6.66	1,530	7.54	672	11,500	2,800	37,200	14	112
Demolition Ground	EP2013983	0089_MW139_201214	MW139	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	258	<1	258	118	113	214	3,670	2.04	283	7.82	90	1,770	447	6,580	10	22
Demolition Ground	EP2013975	0089_MW141_201214	MW141	14/12/2020	<0.05	<0.05	<0.02	<0.05	62.4	*50.1*	64.5	<1	346	<1	346	304	315	396	9,590	1.78	732	7.68	280	5,230	1,260	18,700	14	961
Demolition Ground	EP2013975	0089_MW142_201214	MW142	14/12/2020	<0.05	<0.05	<0.02	<0.05	7.32	*5.61*	7.54	<1	331	<1	331	376	406	412	11,900	3.83	948	7.69	369	6,860	1,640	22,900	12	352
Demolition Ground	EP2013983	0089_MW149_201214	MW149	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	136	<1	136	601	678	497	19,100	5.99	1,540	7.69	670	11,700	2,860	34,000	4	118
WWTP	EP2013984	0089_MW158_201214	MW158	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	440	<1	440	154	138	191	4,750	5.38	338	7.80	110	2,250	526	8,360	14	52
WWTP	EP2013992	0089_MW161_201214	MW161	14/12/2020	<0.05	<0.05	<0.02	<0.05	8.77	*8.21*	8.97	<1	327	<1	327	32.9	30.6	119	774	3.53	76	8.00	36	403	217	1,840	6	773
WWTP	EP2013984	0089_MW166_201214	MW166	14/12/2020	<0.05	<0.05	<0.02	<0.05	8.60	*8.00*	8.67	<1	394	<1	394	36.9	34.4	120	899	3.50	92	7.86	41	455	176	2,070	7	74
WWTP	EP2013992	0089_MW171_201214	MW171	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.23	*0.08*	0.23	<1	326	<1	326	57.4	57.1	113	1,670	0.26	138	7.87	48	893	180	3,510	27	21
WWTP	EP2014087	0089_MW193_201216	MW193	16/12/2020	<0.05	<0.05	<0.02	<0.05	11.5	*8.43*	12.4	<1	484	<1	484	33.7	33.4	158	692	0.47	95	7.65	31	389	218	2,000	22	274
WWTP	EP2014087	0089_MW195D_201216	MW195D	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	193	<1	193	363	396	448	11,500	4.43	949	7.66	349	6,600	1,660	24,200	2	1,090
WWTP	EP2014087	0089_MW195S_201216	MW195S	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	575	<1	575	51.0	51.8	181	1,140	0.74	157	7.87	54	655	356	3,060	20	49
WWTP	EP2014087	0089_MW196_201216	MW196	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	261	<1	261	6.67	6.95	81	33	2.10	21	8.13	2	26	25	410	8	238
WWTP	EP2014087	0089_MW199_201216	MW199	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	368	<1	368	34.0	35.4	97	865	2.01	102	7.98	29	492	107	2,080	6	154
WWTP	EP2014051	0089_MW200_201215	MW200	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	405	<1	405	74.4	72.9	100	2,180	1.01	117	8.14	69	1,300	232	3,910	10	2,010
WWTP	EP2014087	0089_MW202_201216	MW202	16/12/2020	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06	<1	349	<1	349	12.6	13.3	107	167	2.50	23	8.01	9	134	46	738	3	133
WWTP	EP2014087	0089_MW203_201216	MW203	16/12/2020	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	296	<1	296	8.52	9.91	75	46	7.54	43	8.00	6	57	63	533	3	52
Helicopter Support Facility	EP2014041	0089_MW216_201215	MW216	15/12/2020	<0.05	<0.05	<0.02	<0.05	15.6	*4.85*	16.4	<1	354	<1	354	17.3	16.8	148	309	1.21	41	7.86	7	136	71	1,060	11	2,060
Helicopter Support Facility	EP2014041	0089_MW217_201215	MW217	15/12/2020	<0.05	<0.05	<0.02	<0.05	27.9	0.03	27.9	<1	204	<1	204	5.29	5.32	74	37	0.36	6	8.01	2	25	8	274	5	175
Helicopter Support Facility	EP2014041	0089_MW224_201215	MW224	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	237	<1	237	8.52	8.55	64	109	0.20	20	8.14	4	83	34	482	7	247
Helicopter Support Facility	EP2014042	0089_MW226_201215	MW226	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	553	<1	553	475	512	452	14,700	3.82	1,210	7.66	529	8,660	2,350	29,400	50	184
Helicopter Support Facility	EP2014051	0089_MW227_201215	MW227	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	375	<1	375	37.4	38.3	121	910	1.21	68	7.93	25	599	204	2,160	14	111
Helicopter Support Facility	EP2014047	0089_MW228_201215	MW228	15/12/2020	<0.05	<0.05	<0.02	<0.05	37.1	*0.11*	37.2	<1	419	<1	419	311	321	307	9,600	1.69	772	7.73	296	5,400	1,510	21,500	22	154
AVCAT Storage and Fuel Farm	EP2014041	0089_MW233_201215	MW233	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.25	*0.25*	0.25	<1	152	<1	152	3.70	4.17	53	19	5.97	7	8.15	3	20	6	196	8	30
AVCAT Storage and Fuel Farm	EP2014041	0089_MW236_201215	MW236	15/12/2020	<0.05	<0.05	<0.02	<0.05	60.3	*57.5*	63.4	<1	244	<1	244	6.25	6.71	93	37	3.53	15	8.03	2	18	16	352	6	184
AVCAT Storage and Fuel Farm	EP2014041	0089_MW238_201215	MW238	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	190	<1	190	5.87	6.84	86	38	7.66	16	8.04	4	26	48	434	6	286
AVCAT Storage and Fuel Farm	EP2014041	0089_MW239_201215	MW239	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.10	0.02	0.15	<1	221	<1	221	6.64	7.39	93	31	5.35	19	8.07	4	25	65	390	6	37
AVCAT Storage and Fuel Farm	EP2014041	0089_MW240_201215	MW240	15/12/2020	<0.05	<0.05	<0.02	<0.05	1.53	*1.34*	1.64	<1	251	<1	251	7.39	8.35	120	43	6.06	14	7.97	3	26	56	535	8	46
AVCAT Storage and Fuel Farm	EP2014041	0089_MW242_201215	MW242	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	198	<1	198	5.58	6.24	80	36	5.66	13	8.09	2	26	29	362	5	51
AVCAT Storage and Fuel Farm	EP2014041	0089_MW243_201215	MW243	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	253	<1	253	7.67	8.78	117	55	6.76	16	8.05	4	35	51	536	8	41
AVCAT Storage and Fuel Farm	EP2014041	0089_MW245_201215	MW245	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.18	*0.18*	0.18	<1	441	<1	441	9.64	9.39	136	28	1.31	15	7.93	6	28	2	540	42	30
AVCAT Storage and Fuel Farm	EP2014041	0089_MW248_201215	MW248	15/12/2020	<0.05	<0.05	<0.02	<0.05	1.91	*1.46*	2.09	<1	460	<1	460	22.1	21.0	143	306	2.60	59	7.92	21	195	207	1,260	15	26
AVCAT Storage and Fuel Farm	EP2014041	0089_MW249_201215	MW249	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.30	*0.30*	0.30	<1	449	<1	449	12.3	11.3	85	103	4.27	32	8.00	9	97	22	636	19	146
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014106	0089_MW255_201216	MW255	16/12/2020	<0.05	<0.05	<0.02	<0.05	4.00	*3.38*	4.22	<1	384	<1	384	10.8	10.6	116	88	0.95	21	7.96	3	70	33	607	3	1,810
Fire Station, Flammable/Hazardous Goods and Waste St	EP2013975	0089_MW256_201214	MW256	14/12/2020	<0.05	<0.05	<0.02	<0.05	12.4	*9.80*	13.0	<1	321	<1	321	12.2	12.4	126	181	0.42	18	7.85	4	103	35	650	5	316
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014106	0089_MW257_201216	MW257	16/12/2020	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	180	<1	180	5.07	5.30	67	42	2.16	8	8.17	3	28	14	348	7	139
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014092	0089_MW259_201216	MW259	16/12/2020	<0.05	<0.05	<0.02	<0.05	0.85	*0.51*	0.92	<1	291	<1	291	7.20	6.51	84	39	5.05	13	7.89	3	27	14	352	5	1,510
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014087	0089_MW261_201216	MW261	16/12/2020	<0.05	<0.05	<0.02	<0.05	0.23	*0.23*	0.23	<1	416	<1	416	29.3	28.4	148	617	1.58	62	7.91	28	349	172	1,670	19	98
Dredge Spoil / Careening Bay	EP2013975	0089_MW264_201214	MW264	14/12/2020	<0.05	<0.05	<0.02	<0.05	1.41	*1.41*	1.41	<1	440	<1	440	13.1	13.0	95	105	0.33	48	7.92	17	90	66	634	10	265
Dredge Spoil / Careening Bay	EP2013975	0089_MW268_201214	MW268	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.26	*0.20*	0.30	<1	436	<1	436	101	109	197	2,780	3.83	273	7.82	91	1,710	664	6,000	14	300
Dredge Spoil / Careening Bay	EP2013975	0089_MW269_201214	MW269	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.79	*0.65*	0.85	<1	390	<1	390	17.4	16.6	73	284	2.32	52	7.93	16	190	76	900	17	644
Demolition Ground	EP2013983	0089_MW272_201214	MW272	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	175	<1	175	599	678	502	19,000	6.19	1,540	7.72	680	11,700	2,860	34,800	6	144
Helicopter Support Facility	EP2014041	0089_MW282_201215	MW282	15/12/2020	<0.05	<0.05	<0.02	<0.05	111	*85.3*	123	<1	526	<1	526	12.5	13.8	187	57	4.74	26	7.73	1	52	19	790	9	1,600
Accomodation Area	EP2014042	0089_MW289_201215	MW289	15/12/2020	<0.05	<0.05	<0.02	<0.05	1.81	*1.72*	1.89	<1	321	<1	321	9.02	9.56	94	46	2.90	25	7.97	8	60	63	556	8	112
AVCAT Storage and Fuel Farm	EP2014087	0089_MW516_201216	MW516	16/12/2020	<0.05	<0.05	<0.02	<0.05	6.88	*6.53*	7.09	<1	542	<1	542	15.6	15.6	156	140	0.02	40	7.69	12	98	42	894	24	1,500
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014041	0089_MW517_201215	MW517	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	192	<1	192	5.50	5.29	57	56	1.90	8	8.12	2	40	4	299	8	284

Table 1: Water Analytical Results

					oalkyl Sulfonamides				PFAS			Inorganics																
					N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)_	Sum of PFHxS and PFOS	Sum of PFAS	Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Calcium (filtered)	Chloride	Ionic Balance	Magnesium (filtered)	pH (Lab)	Potassium (filtered)	Sodium (filtered)	Sulphate as SO4 - Turbidimetric (filtered)	TDS	TOC	Total Suspended Solids
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	mg/L	%	mg/L	pH Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL					0.05	0.05	0.02	0.05	0.01	0.01	0.01	1	1	1	1	0.01	0.01	1	1	0.01	1	0.01	1	1	1	10	1	5
Human Health - Drinking Water Quality Guideline										*0.07*																	
Human Health – Recreational Water										2																	
Ecological – 99% species protection																											
Monitoring Area	Lab Report Number	Field ID	Location Code	Date																							
Fire Station, Flammable/Hazardous Goods and Waste St	EP2014092	0089_MW518_201216	MW518	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	336	<1	336	23.3	22.5	132	451	1.73	68	8.02	18	226	184	1,470	8	1,310
WWTP (East)	EP2014048	0089_PW304_201215	PW304	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	209	<1	209	453	469	391	14,400	1.72	1,090	7.64	451	8,010	2,060	28,000	15	1,460
Helicopter Support Facility	EP2014048	0089_PW306_201215	PW306	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	184	<1	184	631	677	517	20,100	3.51	1,520	7.52	677	11,700	2,910	42,100	6	318
Helicopter Support Facility	EP2014053	0089_PW307_201215	PW307	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	123	<1	123	627	722	525	19,900	7.07	1,630	7.81	710	12,500	3,030	43,500	2	240
Helicopter Support Facility	EP2014053	0089_PW308_201215	PW308	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	117	<1	117	614	703	507	19,400	6.83	1,580	7.88	684	12,200	3,070	44,000	6	185
Helicopter Support Facility	EP2014048	0089_PW314_201215	PW314	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	341	<1	341	638	721	578	20,300	6.14	1,630	7.28	737	12,400	2,800	41,300	18	66
Helicopter Support Facility	EP2014048	0089_PW315_201215	PW315	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	126	<1	126	644	706	516	20,600	4.55	1,590	7.66	718	12,200	2,910	42,800	3	67
Helicopter Support Facility	EP2014053	0089_PW316_201215	PW316	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.10	*0.10*	0.10	<1	144	<1	144	636	723	527	20,200	6.37	1,630	7.87	725	12,500	3,050	43,000	13	1,730
Demolition Ground	EP2013973	0089_PW329_201214	PW329	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	134	<1	134	610	689	472	19,400	6.10	1,550	7.85	616	12,000	2,870	37,500	6	146
Demolition Ground	EP2013989	0089_PW330_201214	PW330	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	128	<1	128	626	731	516	19,900	7.77	1,640	7.77	715	12,700	2,980	40,300	11	72
Demolition Ground	EP2013973	0089_PW331_201214	PW331	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	142	<1	142	606	712	509	19,300	7.99	1,620	7.75	703	12,300	2,840	34,900	8	47
Fire Training Area	EP2013985	0089_PW335_201214	PW335	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	192	<1	192	621	704	511	19,800	6.19	1,580	7.48	679	12,200	2,840	39,600	6	125
Fire Training Area	EP2013988	0089_PW340_201214	PW340	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	143	<1	143	642	723	526	20,400	5.93	1,640	7.69	721	12,500	3,080	39,500	15	135
Fire Training Area	EP2013988	0089_PW341_201214	PW341	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	141	<1	141	637	750	545	20,200	8.17	1,680	7.69	750	13,000	3,080	32,700	8	193
WWTP (East)	EP2014053	0089_PW345_201215	PW345	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	425	<1	425	750	903	721	23,600	9.25	2,000	7.40	948	15,600	3,660	53,600	13	2,950
Accomodation Area	EP2014044	0089_PW346_201215	PW346	15/12/2020	<0.05	<0.05	<0.02	<0.05	3.36	*3.16*	3.46	<1	153	<1	153	106	108	90	3,230	0.64	269	7.84	94	1,810	587	6,410	<1	55
WWTP (West)	EP2014090	0089_PW350_201216	PW350	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	644	691	509	20,600	3.52	1,590	7.82	660	11,900	2,900	36,700	3	99
WWTP (West)	EP2014090	0089_PW351_201216	PW351	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	144	<1	144	629	695	506	20,100	4.95	1,590	7.88	659	12,000	2,860	40,100	4	155
WWTP (West)	EP2014090	0089_PW352_201216	PW352	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	628	679	499	20,100	3.84	1,560	7.99	643	11,700	2,840	39,400	3	107
Demolition Ground	EP2013973	0089_PW356_201214	PW356	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	246	<1	246	596	694	504	18,900	7.59	1,570	7.72	684	12,000	2,780	37,100	9	99
Demolition Ground	EP2013989	0089_PW357_201214	PW357	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	123	<1	123	625	710	504	19,900	6.39	1,610	7.84	681	12,300	2,930	40,200	8	166
Demolition Ground	EP2013989	0089_PW358_201214	PW358	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	128	<1	128	657	783	548	20,900	8.79	1,760	7.80	762	13,600	3,100	38,000	7	93
Fire Training Area	EP2013988	0089_PW362_201214	PW362	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	132	<1	132	630	665	499	20,000	2.71	1,510	7.68	618	11,500	3,040	38,000	8	273
Fire Training Area	EP2013988	0089_PW363_201214	PW363	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.25	<0.01	0.25	<1	131	<1	131	633	707	517	20,100	5.52	1,610	7.64	692	12,200	3,030	37,800	6	105
Fire Training Area	EP2013985	0089_PW364_201214	PW364	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	150	<1	150	617	728	519	19,600	8.23	1,650	7.72	704	12,600	2,940	39,000	6	238
WWTP (East)	EP2014048	0089_PW367_201215	PW367	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.13	*0.13*	0.13	<1	174	<1	174	630	704	503	20,100	5.49	1,580	7.68	700	12,200	2,880	40,800	7	370
WWTP (East)	EP2014048	0089_PW368_201215	PW368	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05	<1	258	<1	258	564	587	446	17,900	1.98	1,340	7.56	578	10,100	2,580	36,700	8	153
WWTP (East)	EP2014053	0089_PW369_201215	PW369	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.89	*0.69*	0.89	<1	189	<1	189	625	701	528	19,800	5.74	1,590	7.59	698	12,100	3,020	43,900	6	2,320
Dredge Spoil / Careening Bay	EP2013989	0089_PW374_201214	PW374	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	126	<1	126	674	772	546	21,500	6.78	1,740	7.90	749	13,400	3,140	42,000	6	180
Dredge Spoil / Careening Bay	EP2013989	0089_PW375_201214	PW375	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	120	<1	120	642	733	520	20,400	6.64	1,660	7.86	707	12,700	3,070	41,200	6	426
Dredge Spoil / Careening Bay	EP2013989	0089_PW378_201214	PW378	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	112	<1	112	626	726	509	19,900	7.41	1,640	7.88	696	12,600	3,000	39,700	6	527
WWTP (West)	EP2014090	0089_PW380_201216	PW380	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	121	<1	121	639	673	498	20,400	2.60	1,550	7.96	645	11,600	2,950	40,500	2	45
WWTP (West)	EP2014104	0089_PW381_201216	PW381	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	113	<1	113	626	665	475	20,000	3.08	1,520	7.99	635	11,500	2,840	42,700	7	36
WWTP (West)	EP2014090	0089_PW401_201216	PW401	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	122	<1	122	632	667	493	20,200	2.66	1,530	7.85	635	11,500	2,890	39,700	6	76
Helicopter Support Facility	EP2014048	0089_PW405_201215	PW405	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	133	<1	133	647	704	505	20,700	4.18	1,580	7.62	692	12,200	2,910	37,100	6	209
Helicopter Support Facility	EP2014053	0089_PW407_201215	PW407	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	136	<1	136	638	710	516	20,200	5.39	1,600	7.69	700	12,300	3,130	44,000	7	240
Helicopter Support Facility	EP2014044	0089_PW409_201215	PW409	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	123	<1	123	615	724	504	19,600	8.14	1,620	7.54	667	12,600	2,850	35,200	11	64
Helicopter Support Facility	EP2014044	0089_PW411_201215	PW411	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	120	<1	120	616	694	484	19,600	5.94	1,550	7.75	637	12,100	2,940	39,500	6	64
Helicopter Support Facility	EP2014044	0089_PW413_201215	PW413	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	125	<1	125	616	720	496	19,600	7.84	1,590	7.61	658	12,600	2,900	35,400	7	30
Helicopter Support Facility	EP2014044	0089_PW415_201215	PW415	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	126	<1	126	619	730	505	19,700	8.25	1,640	7.67	684	12,700	2,910	38,500	<1	45
Fire Training Area	EP2013985	0089_SW130_201214	SW130	14/12/2020	<0.05	<0.05	<0.02	<0.05	0.09	<0.01	0.09	<1	134	<1	134	622	704	498	19,800	6.18	1,590	7.97	677	12,200	2,910	38,900	6	114
Fire Training Area	EP2013988	0089_SW132_201214	SW132	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	124	<1	124	639	765	561	20,300	8.99	1,740	7.60	757	13,200	3,050	38,200	6	70
Fire Training Area	EP2013988	0089_SW134_201214	SW134	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	133	<1	133	635	739	535	20,200	7.57	1,670	8.04	726	12,800	3,020	38,600	5	31
Demolition Ground	EP2013973	0089_SW150_201214	SW150	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	121	<1	121	609	724	518	19,400	8.62	1,650	8.08	716	12,500	2,840	35,200	3	198
Demolition Ground	EP2013973	0089_SW152_201214	SW152	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	120	<1	120	608	688	495	19,400	6.16	1,560	8.09	677	11,900	2,810	37,000	3	174
Demolition Ground	EP2013989	0089_SW154_201214	SW154	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	122	<1	122	636	733	518	20,200	7.11	1,660	8.01	714	12,700	3,050	35,400	2	164
Demolition Ground	EP2013989	0089_SW156_201214	SW156	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	121	<1	121	620	721	513	19,600	7.53	1,630	7.99	697	12,500	3,120	39,200	3	22
WWTP (East)	EP2014048	0089_SW305_201215	SW305	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.13	*0.13*	0.13	<1	125	<1	125	613	700	510	19,600	6.58	1,580	8.18	696	12,100	2,780	41,000	<1	190
Helicopter Support Facility	EP2014048	0089_SW309_201215	SW309	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	140	<1	140	626	693	504	20,000	5.06	1,560	7.59	693	12,000	2,860	41,300	88	154
Helicopter Support Facility	EP2014048	0089_SW310_201215	SW310	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	119	<1	119	626	683	496	20,000	4.33	1,550	8.00	679	11,800	2,870	41,300	8	64
Helicopter Support Facility	EP2014053	0089_SW311_201215	SW311	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	119	<1	119	633	704	508	20,100	5.37	1,590	8.09	687	12,200	3,040	42,300	3	170
Dredge Spoil / Careening Bay	EP2013989	0089_SW317_201214	SW317	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	630	724	506	20,000	6.98	1,620	8.04	694	12,600	3,040	37,600	3	292
Dredge Spoil / Careening Bay	EP2013989	0089_SW318_201214	SW318	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	123	<1	123	631	726	510	20,100	7.04	1,640	8.07	694	12,600	2,940	39,400	3	60
Dredge Spoil / Careening Bay	EP2013989	0089_SW319_201214	SW319	14/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	161	<1	161	641	737	520	20,400	7.00	1,660	7.97	706	12,800	2,990	40,700	3	276
WWTP (West)	EP2014090	0089_SW353_201216	SW353	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	121	<1	121	625	655	480	20,000	2.32	1,500	8.10	621	11,300	2,810	38,500	4	35
WWTP (East)	EP2014053	0089_SW370_201215	SW370	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05	<1	147	<1	147	624	744	544	19,800	8.81	1,670	7.97	726	12,900	2,990	43,400	5	140
WWTP (East)	EP2014048	0089_SW371_201215	SW371	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.31	*0.31*	0.31	<1	140	<1	140	608	682	501	19,400	5.78	1,540	8.03	677	11,800	2,770	40,700	58	28
WWTP (East)	EP2014044	0089_SW372_201215	SW372	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	104	<1	104	524	567	395	16,600	3.89	1,270	8.18	514	9,870	2,590	33,000	4	27
WWTP (East)	EP2014044	0089_SW373_201215	SW373	15/12/2020	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05	<1	92	<1	92	500	552	379	15,600	4.92	1,220	7.95	496	9,650	2,790	31,400	4	23
WWTP (West)	EP2014104	0089_SW382_201216	SW382	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	626	716	504	20,000	6.71	1,620	8.05	698	12,400	2,840	40,000	5	14
WWTP (West)	EP2014090	0089_SW383_201216	SW383	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	107	<1	107	626	655	484	20,000	2.22	1,500	7.58	621	11,300	2,890	39,800	15	40
WWTP (West)	EP2014090	0089_SW384_201216	SW384	16/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	117	<1	117	626	690	511	20,000	4.91	1,590	7.85	647	11,900	2,850	38,800	2	56
Helicopter Support Facility	EP2014048	0089_SW406_201215	SW406	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	137	<1	137	620	676	495	19,800	4.30	1,520	7.96	667	11,700	2,820	41,200	7	260
Helicopter Support Facility	EP2014053	0089_SW408_201215	SW408	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	142	<1	142	610	660	488	19,300	4.01	1,500	7.91	657	11,400	2,990	40,400	5	86
Helicopter Support Facility	EP2014044	0089_SW410_201215	SW410	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	141	<1	141	614	689	484	19,600	5.71	1,540	7.94	627	12,000	2,820	39,300	4	35
Helicopter Support Facility	EP2014044	0089_SW412_201215	SW412	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	119	<1	119	600	712	494	19,100	8.52	1,590	7.99	652	12,400	2,820	31,700	4	12
Helicopter Support Facility	EP2014044	0089_SW414_201215	SW414	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	124	<1	124	605	654	457	19,200	3.90	1,460	8.02	602	11,400	2,930	39,200	4	34
Helicopter Support Facility	EP2014044	0089_SW416_201215	SW416	15/12/2020	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	126	<1	126	621	712	495	19,800	6.77	1,590	8.08	654	12,400	2,900	40,200	3	23

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

*LOR value adopted for PFOS

Table 2: Sediment Analytical Results

					Perfluoroalkane Sulfonic Acids						Perfluoroalkane Carboxylic Acids										
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002
Ecological - Direct Exposure (Interim Guidleines)									*1*						*10*						
Ecological - Indirect Exposure (Interim Guidelines)									0.01												
Human Health - Commercial/Industrial (On-base)															50						
Monitoring Area	Lab Report Number	Field ID	Location Code	Date																	
Stirling/Waste Water Treatment Plant East	EP2014049	0089_SD304_201215	SD304	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014049	0089_SD306_201215	SD306	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014052	0089_SD307_201215	SD307	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014052	0089_SD308_0.50_201215	SD308	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014049	0089_SD314_201215	SD314	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014049	0089_SD315_201215	SD315	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014052	0089_SD316_201215	SD316	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Demolition Ground	EP2013974	0089_SD329_201214	SD329	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Demolition Ground	EP2013990	0089_SD330_201214	SD330	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Demolition Ground	EP2013974	0089_SD331_201214	SD331	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Fire Training Area	EP2013986	0089_SD335_201214	SD335	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Fire Training Area	EP2013987	0089_SD340_201214	SD340	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Fire Training Area	EP2013987	0089_SD341_201214	SD341	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Waste Water Treatment Plant East	EP2014052	0089_SD345_201215	SD345	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Waste Water Treatment Plant East	EP2014043	0089_SD346_201215	SD346	15/12/2020	<0.0002	<0.0002	0.0002	<0.0002	0.0094	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD350_201216	SD350	16/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD351_201216	SD351	16/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD352_201216	SD352	16/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Demolition Ground	EP2013974	0089_SD356_201214	SD356	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Demolition Ground	EP2013974	0089_SD357_201214	SD357	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Demolition Ground	EP2013990	0089_SD358_0.30_201214	SD358	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Fire Training Area	EP2013987	0089_SD362_201214	SD362	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Fire Training Area	EP2013987	0089_SD363_201214	SD363	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Fire Training Area	EP2013986	0089_SD364_201214	SD364	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Waste Water Treatment Plant East	EP2014049	0089_SD367_201215	SD367	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Waste Water Treatment Plant East	EP2014049	0089_SD368_201215	SD368	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Waste Water Treatment Plant East	EP2014052	0089_SD369_201215	SD369	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Dredge Spoil / Careening Bay	EP2013990	0089_SD374_201214	SD374	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Dredge Spoil / Careening Bay	EP2013990	0089_SD375_0.30_201214	SD375	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Dredge Spoil / Careening Bay	EP2013990	0089_SD378_201214	SD378	14/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD380_201216	SD380	16/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD381_201216	SD381	16/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD401_201216	SD401	16/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014049	0089_SD405_201215	SD405	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014052	0089_SD407_201215	SD407	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014043	0089_SD409_201215	SD409	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014043	0089_SD411_201215	SD411	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014043	0089_SD413_201215	SD413	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Stirling/Helicopter Support Facility	EP2014043	0089_SD415_201215	SD415	15/12/2020	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

Table 2: Sediment Analytical Results

					(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS			Inorganics								Organic
					4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)_	Sum of PFHxS and PFOS	Sum of PFAS	Exchangeable Sodium Percent	Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	CEC	Electrical conductivity *(lab)	pH (Lab)	Organic Matter
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	µS/cm	pH Units	%
EQL					0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	0.5
Ecological - Direct Exposure (Interim Guidleines)																											
Ecological - Indirect Exposure (Interim Guidelines)																											
Human Health - Commercial/Industrial (On-base)																	20										
Monitoring Area	Lab Report Number	Field ID	Location Code	Date																							
Stirling/Waste Water Treatment Plant East	EP2014049	0089_SD304_201215	SD304	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.9	5.4	0.8	<0.1	0.2	6.4	2,960	8.6	1.2
Stirling/Helicopter Support Facility	EP2014049	0089_SD306_201215	SD306	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.9	2.2	0.4	<0.1	0.1	2.7	2,810	8.6	1.0
Stirling/Helicopter Support Facility	EP2014052	0089_SD307_201215	SD307	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	8.0	2.4	0.4	<0.1	0.2	3.1	2,650	9.0	1.0
Stirling/Helicopter Support Facility	EP2014052	0089_SD308_0.50_201215	SD308	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	8.2	2.4	0.3	<0.1	0.2	3.0	2,190	9.2	0.8
Stirling/Helicopter Support Facility	EP2014049	0089_SD314_201215	SD314	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	6.7	2.6	0.4	<0.1	0.2	3.2	2,550	8.6	<0.5
Stirling/Helicopter Support Facility	EP2014049	0089_SD315_201215	SD315	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.7	3.5	0.5	<0.1	0.2	4.3	2,120	8.8	0.5
Stirling/Helicopter Support Facility	EP2014052	0089_SD316_201215	SD316	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.9	5.5	0.7	<0.1	0.2	6.4	3,080	9.0	0.8
Stirling/Demolition Ground	EP2013974	0089_SD329_201214	SD329	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	3.3	3.9	0.5	<0.1	0.2	4.5	4,360	9.1	<0.5
Stirling/Demolition Ground	EP2013990	0089_SD330_201214	SD330	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.4	3.4	0.4	<0.1	0.2	4.0	4,120	9.1	0.6
Stirling/Demolition Ground	EP2013974	0089_SD331_201214	SD331	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.6	2.1	0.3	<0.1	0.1	2.5	4,430	9.0	0.9
Stirling/Fire Training Area	EP2013986	0089_SD335_201214	SD335	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	5.4	2.1	0.3	<0.1	0.1	2.6	4,610	8.9	0.5
Stirling/Fire Training Area	EP2013987	0089_SD340_201214	SD340	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.0	11.8	1.2	<0.1	0.2	13.3	3,480	9.1	1.2
Stirling/Fire Training Area	EP2013987	0089_SD341_201214	SD341	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.0	3.4	0.5	<0.1	0.2	4.1	3,480	9.1	0.6
Stirling/Waste Water Treatment Plant East	EP2014052	0089_SD345_201215	SD345	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.1	4.3	0.6	<0.1	0.2	5.1	5,820	8.3	0.6
Stirling/Waste Water Treatment Plant East	EP2014043	0089_SD346_201215	SD346	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0096	0.0096	0.0096	1.2	6.2	1.0	<0.1	<0.1	7.3	629	9.0	1.5
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD350_201216	SD350	16/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004	6.1	3.2	0.4	<0.1	0.2	3.8	3,220	9.2	0.7
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD351_201216	SD351	16/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	5.0	4.1	0.4	<0.1	0.2	4.8	1,450	9.5	<0.5
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD352_201216	SD352	16/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	5.2	4.2	0.4	<0.1	0.2	4.9	1,320	9.6	<0.5
Stirling/Demolition Ground	EP2013974	0089_SD356_201214	SD356	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	3.4	4.7	0.5	<0.1	0.2	5.4	4,590	8.8	<0.5
Stirling/Demolition Ground	EP2013974	0089_SD357_201214	SD357	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.4	3.2	0.4	<0.1	0.2	3.8	3,710	9.1	<0.5
Stirling/Demolition Ground	EP2013990	0089_SD358_0.30_201214	SD358	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	5.2	3.1	0.4	<0.1	0.2	3.8	4,020	9.1	<0.5
Stirling/Fire Training Area	EP2013987	0089_SD362_201214	SD362	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	3.7	3.6	0.5	<0.1	0.2	4.2	3,280	9.2	<0.5
Stirling/Fire Training Area	EP2013987	0089_SD363_201214	SD363	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.0	3.7	0.5	<0.1	0.2	4.4	4,190	9.1	<0.5
Stirling/Fire Training Area	EP2013986	0089_SD364_201214	SD364	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.6	3.2	0.4	<0.1	0.2	3.8	4,330	9.1	0.5
Stirling/Waste Water Treatment Plant East	EP2014049	0089_SD367_201215	SD367	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0007	0.0007	0.0007	3.2	6.0	0.9	<0.1	0.2	7.2	3,630	8.7	1.0
Stirling/Waste Water Treatment Plant East	EP2014049	0089_SD368_201215	SD368	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.5	7.6	0.9	<0.1	0.2	8.8	2,710	8.7	<0.5
Stirling/Waste Water Treatment Plant East	EP2014052	0089_SD369_201215	SD369	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003	4.0	4.1	0.6	<0.1	0.2	4.9	4,510	8.7	0.6
Stirling/Dredge Spoil / Careening Bay	EP2013990	0089_SD374_201214	SD374	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	6.1	2.0	0.3	<0.1	0.1	2.4	3,070	9.2	0.8
Stirling/Dredge Spoil / Careening Bay	EP2013990	0089_SD375_0.30_201214	SD375	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.9	2.6	0.4	<0.1	0.2	3.1	3,090	9.3	0.6
Stirling/Dredge Spoil / Careening Bay	EP2013990	0089_SD378_201214	SD378	14/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.3	3.1	0.4	<0.1	0.2	3.7	3,580	9.2	0.5
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD380_201216	SD380	16/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	7.5	2.5	0.3	<0.1	0.2	3.0	1,800	9.4	<0.5
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD381_201216	SD381	16/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	5.8	2.8	0.3	<0.1	0.2	3.3	1,500	9.5	<0.5
Stirling/Waste Water Treatment Plant West	EP2014091	0089_SD401_201216	SD401	16/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004	5.5	3.1	0.4	<0.1	0.2	3.7	2,140	9.3	<0.5
Stirling/Helicopter Support Facility	EP2014049	0089_SD405_201215	SD405	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	5.0	3.2	0.5	<0.1	0.2	3.9	3,920	8.5	0.6
Stirling/Helicopter Support Facility	EP2014052	0089_SD407_201215	SD407	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.0	3.2	0.5	<0.1	0.2	3.9	3,930	8.7	0.5
Stirling/Helicopter Support Facility	EP2014043	0089_SD409_201215	SD409	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	3.0	4.0	0.5	<0.1	0.1	4.7	2,890	8.8	0.6
Stirling/Helicopter Support Facility	EP2014043	0089_SD411_201215	SD411	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	5.0	2.7	0.3	<0.1	0.2	3.2	3,010	9.0	<0.5
Stirling/Helicopter Support Facility	EP2014043	0089_SD413_201215	SD413	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	3.8	3.7	0.4	<0.1	0.2	4.4	4,290	8.9	0.7
Stirling/Helicopter Support Facility	EP2014043	0089_SD415_201215	SD415	15/12/2020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.9	2.7	0.3	<0.1	0.2	3.2	3,440	8.9	0.8

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

Table 3: Rinsate Blanks Analytical Results

				Perfluoroalkane Sulfonic Acids						Perfluoroalkane Carboxylic Acids										
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
				0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02
Lab Report Number	Field ID	Date	Sample Type																	
EP2013975	0089_QC301_201214	14/12/2020	Rinsate	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2013975	0089_QC302_201214	14/12/2020	Rinsate	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2013975	0089_QC303_201214	14/12/2020	Rinsate	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2013975	0089_QC304_201214	14/12/2020	Rinsate	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2013975	0089_QC401_201214	14/12/2020	Field Blank	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2013975	0089_QC402_201214	14/12/2020	Field Blank	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2013975	0089_QC403_201214	14/12/2020	Field Blank	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014047	0089_QC301_201215	15/12/2020	Rinsate	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014047	0089_QC302_201215	15/12/2020	Rinsate	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014047	0089_QC303_201215	15/12/2020	Rinsate	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014047	0089_QC304_201215	15/12/2020	Rinsate	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014047	0089_QC401_201215	15/12/2020	Field Blank	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014047	0089_QC402_201215	15/12/2020	Field Blank	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014047	0089_QC403_201215	15/12/2020	Field Blank	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014047	0089_QC404_201215	15/12/2020	Field Blank	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014106	0089_QC301_201216	16/12/2020	Rinsate	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014106	0089_QC302_201216	16/12/2020	Rinsate	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014106	0089_QC401_201216	16/12/2020	Field Blank	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
EP2014106	0089_QC402_201216	16/12/2020	Field Blank	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02

Table 3: Rinsate Blanks Analytical Results

				(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS		
				4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)_	Sum of PFHxS and PFOS	Sum of PFAS
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
				0.05	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01
Lab Report Number	Field ID	Date	Sample Type														
EP2013975	0089_QC301_201214	14/12/2020	Rinsate	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2013975	0089_QC302_201214	14/12/2020	Rinsate	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2013975	0089_QC303_201214	14/12/2020	Rinsate	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2013975	0089_QC304_201214	14/12/2020	Rinsate	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2013975	0089_QC401_201214	14/12/2020	Field Blank	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2013975	0089_QC402_201214	14/12/2020	Field Blank	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2013975	0089_QC403_201214	14/12/2020	Field Blank	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014047	0089_QC301_201215	15/12/2020	Rinsate	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014047	0089_QC302_201215	15/12/2020	Rinsate	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014047	0089_QC303_201215	15/12/2020	Rinsate	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014047	0089_QC304_201215	15/12/2020	Rinsate	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014047	0089_QC401_201215	15/12/2020	Field Blank	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014047	0089_QC402_201215	15/12/2020	Field Blank	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014047	0089_QC403_201215	15/12/2020	Field Blank	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014047	0089_QC404_201215	15/12/2020	Field Blank	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014106	0089_QC301_201216	16/12/2020	Rinsate	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014106	0089_QC302_201216	16/12/2020	Rinsate	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014106	0089_QC401_201216	16/12/2020	Field Blank	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2014106	0089_QC402_201216	16/12/2020	Field Blank	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01

Lab Report Number			EP2013973	EP2013973		EP2013973	765054		EP2013985	EP2013985		EP2013985	765054		
Field ID			0089_PW331_201214	0089_QC104_201214		0089_PW331_201214	0089_QC204_201114		0089_PW335_201214	0089_QC105_201214		0089_PW335_201214	0089_QC205_201114		
Date			14/12/2020	14/12/2020		14/12/2020	14/12/2020		14/12/2020	14/12/2020		14/12/2020	14/12/2020		
Matrix Type			Water	Water	RPD	Water	Water	RPD	Water	Water	RPD	Water	Water	RPD	
	Unit	EQL													
Perfluoroalkane Sulfonic Acids															
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluoroalkane Carboxylic Acids															
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
(n:2) Fluorotelomer Sulfonic Acids															
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	
Perfluoroalkyl Sulfonamides															
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	
PFAS															
Sum of PFAS (WA DER List)_	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0	
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0	
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-	
Sum of PFAS (PFOS + PFOA)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-	
Inorganics															
Carbonate Alkalinity (as CaCO3)	mg/L	1	<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0	
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	142	141	1	142	180	24	192	192	0	192	240	22	
Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1	<1	0	<1	<20	0	<1	<1	0	<1	<20	0	
Alkalinity (total) as CaCO3	mg/L	1	142	141	1	142	180	24	192	192	0	192	240	22	
Anions Total	meq/L	0.01	606	606	0	606	-	-	621	629	1	621	-	-	
Cations Total	meq/L	0.01	712	711	0	712	-	-	704	734	4	704	-	-	
Calcium	mg/L	0.5	-	-	-	-	470	-	-	-	-	-	490	-	
Calcium (filtered)	mg/L	1	509	512	1	509	-	-	511	539	5	511	-	-	
Chloride	mg/L	1	19,300	19,300	0	19,300	49,000	87	19,800	20,000	1	19,800	20,000	1	
Ionic Balance	%	0.01	7.99	7.98	0	7.99	-	-	6.19	7.70	22	6.19	-	-	
Magnesium	mg/L	0.5	-	-	-	-	1,500	-	-	-	-	-	1,500	-	
Magnesium (filtered)	mg/L	1	1,620	1,610	1	1,620	-	-	1,580	1,660	5	1,580	-	-	
pH (Lab)	pH Units	0.01	7.75	7.76	0	7.75	7.6	2	7.48	7.57	1	7.48	7.5	0	
Potassium	mg/L	0.5	-	-	-	-	450	-	-	-	-	-	450	-	
Potassium (filtered)	mg/L	1	703	703	0	703	-	-	679	712	5	679	-	-	
Sodium	mg/L	0.5	-	-	-	-	11,000	-	-	-	-	-	11,000	-	
Sodium (filtered)	mg/L	1	12,300	12,300	0	12,300	-	-	12,200	12,700	4	12,200	-	-	
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1	2,840	2,820	1	2,840	-	-	2,840	2,940	3	2,840	-	-	
Sulphate	mg/L	5	-	-	-	-	3,100	-	-	-	-	-	3,100	-	
TDS	mg/L	10	34,900	37,000	6	34,900	33,000	6	39,600	37,200	6	39,600	44,000	11	
TOC	mg/L	1	8	9	12	8	-	-	6	6	0	6	-	-	
Total Suspended Solids	mg/L	1	47	44	7	47	70	39	125	418	108	125	220	55	

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: No Limit (1 - 10 x EQL); 50 (10 - 20 x EQL); 20 (> 20 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Lab Report Number		EP2013988	EP2013988		EP2013988	765054		EP2013983	EP2013983		EP2013983	765054	
Field ID		0089_SW132_201214	0089_QC107_201214		0089_SW132_201214	0089_QC207_201114		0089_MW272_201214	0089_QC106_201214		0089_MW272_201214	0089_QC206_201114	
Date		14/12/2020	14/12/2020		14/12/2020	14/12/2020		14/12/2020	14/12/2020		14/12/2020	14/12/2020	
Matrix Type		Water	Water	RPD	Water	Water	RPD	Water	Water	RPD	Water	Water	RPD
	Unit	EQL											
Perfluoroalkane Sulfonic Acids													
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroalkane Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
(n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	0.09	57	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFAS (WA DER List)_	µg/L	0.01	<0.01	<0.01	0	<0.01	0.09	160	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Sum of PFAS (PFOS + PFOA)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Inorganics														
Carbonate Alkalinity (as CaCO3)	mg/L	1	<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	124	125	1	124	150	19	175	176	1	175	230	27
Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1	<1	0	<1	<20	0	<1	<1	0	<1	<20	0
Alkalinity (total) as CaCO3	mg/L	1	124	125	1	124	150	19	175	176	1	175	230	27
Anions Total	meq/L	0.01	639	638	0	639	-	-	599	615	3	599	-	-
Cations Total	meq/L	0.01	765	728	5	765	-	-	678	725	7	678	-	-
Calcium	mg/L	0.5	-	-	-	-	470	-	-	-	-	-	510	-
Calcium (filtered)	mg/L	1	561	527	6	561	-	-	502	535	6	502	-	-
Chloride	mg/L	1	20,300	20,300	0	20,300	20,000	1	19,000	19,500	3	19,000	20,000	5
Ionic Balance	%	0.01	8.99	6.60	31	8.99	-	-	6.19	8.18	28	6.19	-	-
Magnesium	mg/L	0.5	-	-	-	-	1,400	-	-	-	-	-	1,500	-
Magnesium (filtered)	mg/L	1	1,740	1,650	5	1,740	-	-	1,540	1,650	7	1,540	-	-
pH (Lab)	pH Units	0.01	7.60	7.67	1	7.60	7.5	1	7.72	7.72	0	7.72	7.6	2
Potassium	mg/L	0.5	-	-	-	-	440	-	-	-	-	-	470	-
Potassium (filtered)	mg/L	1	757	712	6	757	-	-	680	728	7	680	-	-
Sodium	mg/L	0.5	-	-	-	-	12,000	-	-	-	-	-	11,000	-
Sodium (filtered)	mg/L	1	13,200	12,600	5	13,200	-	-	11,700	12,500	7	11,700	-	-
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1	3,050	3,030	1	3,050	-	-	2,860	2,960	3	2,860	-	-
Sulphate	mg/L	5	-	-	-	-	3,100	-	-	-	-	-	3,100	-
TDS	mg/L	10	38,200	37,600	2	38,200	33,000	15	34,800	36,400	4	34,800	37,000	6
TOC	mg/L	1	6	8	29	6	-	-	6	8	29	6	-	-
Total Suspended Solids	mg/L	1	70	61	14	70	310	126	144	272	62	144	290	67

*RPDs have only been considered where a concentration is greater than 1 ti
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RI
***Interlab Duplicates are matched on a per compound basis as methods va

Lab Report Number			EP2013984	EP2013984		EP2013984	765054		EP2013973	EP2013973		EP2013973	765054	
Field ID			0089_MW109_201214	0089_QC108_201214		0089_MW109_201214	0089_QC208_201114		0089_PW329_201214	0089_QC102_201214		0089_PW329_201214	0089_QC202_201114	
Date			14/12/2020	14/12/2020		14/12/2020	14/12/2020		14/12/2020	14/12/2020		14/12/2020	14/12/2020	
Matrix Type			Water	Water	RPD	Water	Water	RPD	Water	Water	RPD	Water	Water	RPD
	Unit	EQL												
Perfluoroalkane Sulfonic Acids														
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01	-	-	-	-	0.03	-	-	-	-	-	<0.01	-
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	0.12	0.12	0	0.12	0.12	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	0.31	0.34	9	0.31	0.33	6	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	8.32	8.68	4	8.32	9.0	8	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	1.10	1.20	9	1.10	0.64	53	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	10.0	10.1	1	10.0	11	10	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroalkane Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	0.1	0.1	0	0.1	0.14	33	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	1.31	1.36	4	1.31	1.1	17	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	0.22	0.23	4	0.22	0.21	5	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	0.15	0.16	6	0.15	0.16	6	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.48	0.67	33	0.48	0.67	33	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
(n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFAS (WA DER List)_	µg/L	0.01	20.7	21.4	3	20.7	22.4	8	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFHxS and PFOS	µg/L	0.01	18.3	18.8	3	18.3	20	9	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFAS	µg/L	0.01	22.1	23.0	4	22.1	23.4	6	<0.01	<0.01	0	<0.01	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01	-	-	-	-	20.67	-	-	-	-	-	<0.01	-
Sum of PFAS (PFOS + PFOA)	µg/L	0.01	-	-	-	-	11.67	-	-	-	-	-	<0.01	-
Inorganics														
Carbonate Alkalinity (as CaCO3)	mg/L	1	<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	278	290	4	278	850	101	134	133	1	134	170	24
Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1	<1	0	<1	<20	0	<1	<1	0	<1	<20	0
Alkalinity (total) as CaCO3	mg/L	1	278	290	4	278	850	101	134	133	1	134	170	24
Anions Total	meq/L	0.01	7.34	7.55	3	7.34	-	-	610	603	1	610	-	-
Cations Total	meq/L	0.01	7.23	6.98	4	7.23	-	-	689	676	2	689	-	-
Calcium	mg/L	0.5	-	-	-	-	77	-	-	-	-	-	520	-
Calcium (filtered)	mg/L	1	89	85	5	89	-	-	472	461	2	472	-	-
Chloride	mg/L	1	44	43	2	44	70	46	19,400	19,200	1	19,400	26,000	29
Ionic Balance	%	0.01	0.76	3.89	135	0.76	-	-	6.10	5.68	7	6.10	-	-
Magnesium	mg/L	0.5	-	-	-	-	29	-	-	-	-	-	1,600	-
Magnesium (filtered)	mg/L	1	16	16	0	16	-	-	1,550	1,510	3	1,550	-	-
pH (Lab)	pH Units	0.01	7.95	7.91	1	7.95	7.8	2	7.85	7.85	0	7.85	7.7	2
Potassium	mg/L	0.5	-	-	-	-	3.8	-	-	-	-	-	500	-
Potassium (filtered)	mg/L	1	3	3	0	3	-	-	616	608	1	616	-	-
Sodium	mg/L	0.5	-	-	-	-	62	-	-	-	-	-	12,000	-
Sodium (filtered)	mg/L	1	32	31	3	32	-	-	12,000	11,800	2	12,000	-	-
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1	26	26	0	26	-	-	2,870	2,840	1	2,870	-	-
Sulphate	mg/L	5	-	-	-	-	26	-	-	-	-	-	3,100	-
TDS	mg/L	10	412	408	1	412	530	25	37,500	37,000	1	37,500	34,000	10
TOC	mg/L	1	14	13	7	14	-	-	6	5	18	6	-	-
Total Suspended Solids	mg/L	1	127	1,010	155	127	690	138	146	280	63	146	280	63

*RPDs have only been considered where a concentration is greater than 1 ti
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RI
***Interlab Duplicates are matched on a per compound basis as methods va

Lab Report Number		EP2013989	EP2013989		EP2013989	765054		EP2013975	EP2013975		EP2013975	765054	
Field ID		0089_PW375_201214	0089_QC109_201214		0089_PW375_201214	0089_QC209_201114		0089_MW264_201214	0089_QC110_201214		0089_MW264_201214	0089_QC210_201114	
Date		14/12/2020	14/12/2020		14/12/2020	14/12/2020		14/12/2020	14/12/2020		14/12/2020	14/12/2020	
Matrix Type		Water	Water	RPD	Water	Water	RPD	Water	Water	RPD	Water	Water	RPD
	Unit	EQL											
Perfluoroalkane Sulfonic Acids													
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.03	0.03	0	0.03	0.03	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.02	0.02	0	0.02	0.02	0	1.38	0.99	33	1.38	1.4	1
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroalkane Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	0.02	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
(n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFAS (WA DER List)_	µg/L	0.01	0.02	0.02	0	0.02	<0.05	0	1.41	1.02	32	1.41	1.46	3
Sum of PFHxS and PFOS	µg/L	0.01	0.02	0.02	0	0.02	0.02	0	1.41	1.02	32	1.41	1.43	1
Sum of PFAS	µg/L	0.01	0.02	0.02	0	0.02	<0.1	0	1.41	1.02	32	1.41	1.46	3
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01	-	-	-	-	0.02	-	-	-	-	-	1.43	-
Sum of PFAS (PFOS + PFOA)	µg/L	0.01	-	-	-	-	0.02	-	-	-	-	-	1.4	-
Inorganics														
Carbonate Alkalinity (as CaCO3)	mg/L	1	<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	120	117	3	120	150	22	440	406	8	440	550	22
Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1	<1	0	<1	<20	0	<1	<1	0	<1	<20	0
Alkalinity (total) as CaCO3	mg/L	1	120	117	3	120	150	22	440	406	8	440	550	22
Anions Total	meq/L	0.01	642	637	1	642	-	-	13.1	12.4	5	13.1	-	-
Cations Total	meq/L	0.01	733	649	12	733	-	-	13.0	13.2	2	13.0	-	-
Calcium	mg/L	0.5	-	-	-	-	490	-	-	-	-	-	74	-
Calcium (filtered)	mg/L	1	520	478	8	520	-	-	95	98	3	95	-	-
Chloride	mg/L	1	20,400	20,300	0	20,400	33,000	47	105	104	1	105	150	35
Ionic Balance	%	0.01	6.64	0.94	150	6.64	-	-	0.33	3.16	162	0.33	-	-
Magnesium	mg/L	0.5	-	-	-	-	1,400	-	-	-	-	-	54	-
Magnesium (filtered)	mg/L	1	1,660	1,490	11	1,660	-	-	48	49	2	48	-	-
pH (Lab)	pH Units	0.01	7.86	7.80	1	7.86	7.6	3	7.92	7.97	1	7.92	8.0	1
Potassium	mg/L	0.5	-	-	-	-	440	-	-	-	-	-	14	-
Potassium (filtered)	mg/L	1	707	606	15	707	-	-	17	17	0	17	-	-
Sodium	mg/L	0.5	-	-	-	-	11,000	-	-	-	-	-	110	-
Sodium (filtered)	mg/L	1	12,700	11,200	13	12,700	-	-	90	89	1	90	-	-
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1	3,070	2,980	3	3,070	-	-	66	66	0	66	-	-
Sulphate	mg/L	5	-	-	-	-	3,200	-	-	-	-	-	64	-
TDS	mg/L	10	41,200	40,700	1	41,200	33,000	22	634	636	0	634	780	21
TOC	mg/L	1	6	7	15	6	-	-	10	9	11	10	-	-
Total Suspended Solids	mg/L	1	426	425	0	426	730	53	265	140	62	265	240	10

*RPDs have only been considered where a concentration is greater than 1 ti
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RI
***Interlab Duplicates are matched on a per compound basis as methods va

Lab Report Number		EP2013989	EP2013989		EP2013989	765054		EP2014041	EP2014041		EP2014041	765054	
Field ID		0089_SW319_201214	0089_QC111_201214		0089_SW319_201214	0089_QC211_201114		0089_MW216_201215	0089_QC113_201215		0089_MW216_201215	0089_QC213_201115	
Date		14/12/2020	14/12/2020		14/12/2020	14/12/2020		15/12/2020	15/12/2020		15/12/2020	15/12/2020	
Matrix Type		Water	Water	RPD	Water	Water	RPD	Water	Water	RPD	Water	Water	RPD
	Unit	EQL											
Perfluoroalkane Sulfonic Acids													
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	0.10	-
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.36	0.34	6	0.36	0.34	6
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.62	0.60	3	0.62	0.48	25
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	4.22	3.93	7	4.22	3.6	16
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.11	0.11	0	0.11	0.10	10
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	0.63	0.62	2	0.63	0.59	7
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroalkane Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	0.8	0.7	13	0.8	1.0	22
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	2.88	2.67	8	2.88	2.8	3
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	4.78	4.26	12	4.78	4.3	11
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.37	0.34	8	0.37	0.35	6
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	0.26	0.25	4	0.26	0.28	7
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
(n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	1.32	1.29	2	1.32	0.97	31
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFAS (WA DER List)_	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.05	0	15.6	14.4	8	15.6	14.23	9
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	4.85	4.55	6	4.85	4.19	15
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	16.4	15.1	8	16.4	14.91	10
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	4.47	-
Sum of PFAS (PFOS + PFOA)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	0.87	-
Inorganics														
Carbonate Alkalinity (as CaCO3)	mg/L	1	<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	161	118	31	161	150	7	354	385	8	354	3,400	162
Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1	<1	0	<1	<20	0	<1	<1	0	<1	<20	0
Alkalinity (total) as CaCO3	mg/L	1	161	118	31	161	150	7	354	385	8	354	3,400	162
Anions Total	meq/L	0.01	641	636	1	641	-	-	17.3	17.9	3	17.3	-	-
Cations Total	meq/L	0.01	737	743	1	737	-	-	16.8	17.1	2	16.8	-	-
Calcium	mg/L	0.5	-	-	-	-	500	-	-	-	-	-	120	-
Calcium (filtered)	mg/L	1	520	523	1	520	-	-	148	150	1	148	-	-
Chloride	mg/L	1	20,400	20,300	0	20,400	20,000	2	309	310	0	309	310	0
Ionic Balance	%	0.01	7.00	7.72	10	7.00	-	-	1.21	2.18	57	1.21	-	-
Magnesium	mg/L	0.5	-	-	-	-	1,500	-	-	-	-	-	56	-
Magnesium (filtered)	mg/L	1	1,660	1,670	1	1,660	-	-	41	42	2	41	-	-
pH (Lab)	pH Units	0.01	7.97	8.08	1	7.97	7.8	2	7.86	7.83	0	7.86	7.7	2
Potassium	mg/L	0.5	-	-	-	-	470	-	-	-	-	-	7.6	-
Potassium (filtered)	mg/L	1	706	715	1	706	-	-	7	8	13	7	-	-
Sodium	mg/L	0.5	-	-	-	-	12,000	-	-	-	-	-	180	-
Sodium (filtered)	mg/L	1	12,800	12,900	1	12,800	-	-	136	138	1	136	-	-
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1	2,990	2,950	1	2,990	-	-	71	71	0	71	-	-
Sulphate	mg/L	5	-	-	-	-	3,200	-	-	-	-	-	71	-
TDS	mg/L	10	40,700	40,300	1	40,700	41,000	1	1,060	1,140	7	1,060	860	21
TOC	mg/L	1	3	3	0	3	-	-	11	11	0	11	-	-
Total Suspended Solids	mg/L	1	276	95	98	276	250	10	2,060	5,060	84	2,060	4,900	82

*RPDs have only been considered where a concentration is greater than 1 ti
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RI
***Interlab Duplicates are matched on a per compound basis as methods va

Lab Report Number		EP2014048	EP2014048		EP2014048	765054		EP2014041	EP2014041		EP2014041	765054	
Field ID		0089_SW309_201215	0089_QC112_201215		0089_SW309_201215	0089_QC212_201115		0089_MW238_201215	0089_QC114_201215		0089_MW238_201215	0089_QC214_201115	
Date		15/12/2020	15/12/2020		15/12/2020	15/12/2020		15/12/2020	15/12/2020		15/12/2020	15/12/2020	
Matrix Type		Water	Water	RPD	Water	Water	RPD	Water	Water	RPD	Water	Water	RPD
	Unit	EQL											
Perfluoroalkane Sulfonic Acids													
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	0.02	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroalkane Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
(n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFAS (WA DER List)_	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	0.02	67
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	0.02	-
Sum of PFAS (PFOS + PFOA)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Inorganics														
Carbonate Alkalinity (as CaCO3)	mg/L	1	<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	140	134	4	140	150	7	190	193	2	190	220	15
Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1	<1	0	<1	<20	0	<1	<1	0	<1	<20	0
Alkalinity (total) as CaCO3	mg/L	1	140	134	4	140	150	7	190	193	2	190	220	15
Anions Total	meq/L	0.01	626	632	1	626	-	-	5.87	6.01	2	5.87	-	-
Cations Total	meq/L	0.01	693	682	2	693	-	-	6.84	6.70	2	6.84	-	-
Calcium	mg/L	0.5	-	-	-	-	570	-	-	-	-	-	92	-
Calcium (filtered)	mg/L	1	504	494	2	504	-	-	86	84	2	86	-	-
Chloride	mg/L	1	20,000	20,200	1	20,000	21,000	5	38	35	8	38	120	104
Ionic Balance	%	0.01	5.06	3.83	28	5.06	-	-	7.66	5.42	34	7.66	-	-
Magnesium	mg/L	0.5	-	-	-	-	1,700	-	-	-	-	-	19	-
Magnesium (filtered)	mg/L	1	1,560	1,540	1	1,560	-	-	16	16	0	16	-	-
pH (Lab)	pH Units	0.01	7.59	7.57	0	7.59	7.6	0	8.04	8.08	0	8.04	7.9	2
Potassium	mg/L	0.5	-	-	-	-	540	-	-	-	-	-	4.1	-
Potassium (filtered)	mg/L	1	693	674	3	693	-	-	4	4	0	4	-	-
Sodium	mg/L	0.5	-	-	-	-	9,900	-	-	-	-	-	41	-
Sodium (filtered)	mg/L	1	12,000	11,800	2	12,000	-	-	26	25	4	26	-	-
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1	2,860	2,840	1	2,860	-	-	48	56	15	48	-	-
Sulphate	mg/L	5	-	-	-	-	3,100	-	-	-	-	-	75	-
TDS	mg/L	10	41,300	41,100	0	41,300	39,000	6	434	428	1	434	440	1
TOC	mg/L	1	88	4	183	88	-	-	6	6	0	6	-	-
Total Suspended Solids	mg/L	1	154	134	14	154	160	4	286	75	117	286	140	69

*RPDs have only been considered where a concentration is greater than 1 ti
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RI
***Interlab Duplicates are matched on a per compound basis as methods va

Lab Report Number			EP2014051	EP2014051		EP2014051	765054		EP2014087	EP2014087		EP2014087	765054	
Field ID			0089_MW200_201215	0089_QC115_201215		0089_MW200_201215	0089_QC215_201115		0089_MW196_201216	0089_QC116_201216		0089_MW196_201216	0089_QC216_201116	
Date			15/12/2020	15/12/2020		15/12/2020	15/12/2020		16/12/2020	16/12/2020		16/12/2020	16/12/2020	
Matrix Type			Water	Water	RPD	Water	Water	RPD	Water	Water	RPD	Water	Water	RPD
	Unit	EQL												
Perfluoroalkane Sulfonic Acids														
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroalkane Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
(n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFAS (WA DER List)_	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Sum of PFAS (PFOS + PFOA)	µg/L	0.01	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Inorganics														
Carbonate Alkalinity (as CaCO3)	mg/L	1	<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	405	409	1	405	480	17	261	229	13	261	450	53
Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1	<1	0	<1	<20	0	<1	<1	0	<1	<20	0
Alkalinity (total) as CaCO3	mg/L	1	405	409	1	405	480	17	261	229	13	261	450	53
Anions Total	meq/L	0.01	74.4	73.2	2	74.4	-	-	6.67	5.94	12	6.67	-	-
Cations Total	meq/L	0.01	72.9	71.3	2	72.9	-	-	6.95	6.84	2	6.95	-	-
Calcium	mg/L	0.5	-	-	-	-	120	-	-	-	-	-	73	-
Calcium (filtered)	mg/L	1	100	99	1	100	-	-	81	77	5	81	-	-
Chloride	mg/L	1	2,180	2,140	2	2,180	2,400	10	33	32	3	33	74	77
Ionic Balance	%	0.01	1.01	1.31	26	1.01	-	-	2.10	7.04	108	2.10	-	-
Magnesium	mg/L	0.5	-	-	-	-	110	-	-	-	-	-	30	-
Magnesium (filtered)	mg/L	1	117	114	3	117	-	-	21	22	5	21	-	-
pH (Lab)	pH Units	0.01	8.14	8.17	0	8.14	8.1	0	8.13	8.06	1	8.13	7.9	3
Potassium	mg/L	0.5	-	-	-	-	54	-	-	-	-	-	<5	-
Potassium (filtered)	mg/L	1	69	69	0	69	-	-	2	2	0	2	-	-
Sodium	mg/L	0.5	-	-	-	-	1,400	-	-	-	-	-	36	-
Sodium (filtered)	mg/L	1	1,300	1,270	2	1,300	-	-	26	26	0	26	-	-
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1	232	225	3	232	-	-	25	22	13	25	-	-
Sulphate	mg/L	5	-	-	-	-	240	-	-	-	-	-	38	-
TDS	mg/L	10	3,910	3,890	1	3,910	3,600	8	410	418	2	410	450	9
TOC	mg/L	1	10	2	133	10	-	-	8	5	46	8	-	-
Total Suspended Solids	mg/L	1	2,010	174	168	2,010	230	159	238	668	95	238	820	110

*RPDs have only been considered where a concentration is greater than 1 ti
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RI
***Interlab Duplicates are matched on a per compound basis as methods va

Lab Report Number			EP2013974	EP2013974		EP2013974	765054		EP2013974	EP2013974		EP2013974	765054	
Field ID			0089_SD331_201214	0089_QC103_201214		0089_SD331_201214	0089_QC203_201114		0089_SD329_201214	0089_QC101_201214		0089_SD329_201214	0089_QC201_201114	
Date			14/12/2020	14/12/2020		14/12/2020	14/12/2020		14/12/2020	14/12/2020		14/12/2020	14/12/2020	
Matrix Type			Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD	Soil	Soil	RPD
	Unit	EQL												
Perfluoroalkane Sulfonic Acids														
Perfluoropropanesulfonic acid (PFPrS)	mg/kg	0.005	-	-	-	-	<0.005	-	-	-	-	-	<0.005	-
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanesulfonic acid (PFNS)	mg/kg	0.005	-	-	-	-	<0.005	-	-	-	-	-	<0.005	-
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroalkane Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
(n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS														
Sum of PFAS (WA DER List)_	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
Sum of PFHxS and PFOS	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Sum of PFAS	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.05	0	<0.0002	<0.0002	0	<0.0002	<0.05	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	mg/kg	0.005	-	-	-	-	<0.005	-	-	-	-	-	<0.005	-
Sum of PFAS (PFOS + PFOA)	mg/kg	0.005	-	-	-	-	<0.005	-	-	-	-	-	<0.005	-
Inorganics														
Conductivity (1:5 aqueous extract)	µS/cm	10	-	-	-	-	4,200	-	-	-	-	-	4,300	-
Exchangeable Sodium Percent	%	0.1	4.6	4.4	4	4.6	-	-	3.3	4.3	26	3.3	-	-
pH (1:5 Aqueous extract at 25Â°C as rec.)	pH Units	0.1	-	-	-	-	8.8	-	-	-	-	-	8.9	-
Moisture Content	%	0.1	29.6	33.5	12	29.6	31	5	31.3	36.9	16	31.3	26	18
Exchangeable Calcium	meq/100g	0.1	2.1	3.2	42	2.1	-	-	3.9	3.0	26	3.9	-	-
Exchangeable Magnesium	meq/100g	0.1	0.3	0.4	29	0.3	-	-	0.5	0.4	22	0.5	-	-
Exchangeable Potassium	meq/100g	0.1	<0.1	<0.1	0	<0.1	-	-	<0.1	<0.1	0	<0.1	-	-
Exchangeable Sodium	meq/100g	0.1	0.1	0.2	67	0.1	-	-	0.2	0.2	0	0.2	-	-
CEC	meq/100g	0.05	2.5	3.9	44	2.5	30	169	4.5	3.6	22	4.5	31	149
Electrical conductivity *(lab)	µS/cm	1	4,430	4,540	2	4,430	-	-	4,360	4,790	9	4,360	-	-
pH (Lab)	pH Units	0.1	9.0	9.0	0	9.0	-	-	9.1	9.0	1	9.1	-	-
TOC	mg/kg	1,000	-	-	-	-	53,000	-	-	-	-	-	41,000	-
Organic														
Organic Matter	%	0.5	0.9	<0.5	57	0.9	-	-	<0.5	<0.5	0	<0.5	-	-

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: No Limit (1 - 10 x EQL); 50 (10 - 20 x EQL); 20 (> 20 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

APPENDIX

C

LABORATORY CERTIFICATES

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 [redacted]

☐ **Sydney Laboratory** Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066 02 9900 8400 EnviroSampleNSW@eurofins.com

☐ **Brisbane Laboratory** Unit 1 21 Smallwood Place Murarrie QLD 4172 07 3902 4600 EnviroSampleQLD@eurofins.com

☐ **Perth Laboratory** Unit 2 91 Leach Highway Kewdale WA 6105 08 9251 9600 EnviroSampleWA@eurofins.com

☐ **Melbourne Laboratory** 6 Monterey Road Dandenong South VIC 3175 03 8564 5000 EnviroSampleVic@eurofins.com

Company	CARDNO	Project №	WA_0089_PFASOMP	Project Manager	[redacted]
Address	11 harvest Tce WEST PERTH	Project Name	HMAS Stirling	EDD Format ESdat, EQUIS etc	ESdat
Contact Name	[redacted]				
Phone №					
Special Directions	Please send ESdat report to derp.labreports@esdat.com.au with the project ID in the header file.				
Purchase Order	DEF19009/730				
Quote ID №					

Sampler(s)	[redacted]				
Handed over by					
Email for Invoice					
Email for Results					

Analyses (Where metals are required, please specify 'Total' or 'Filtered'. Suite codes must be used to attract Suite pricing.)

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Full PFAS suite	(water) Major anions & cations	(water) TOC, TSS, TDS, pH	(sediment) TOC, CEC, pH
1	0089_QC201_201214	14-12-20	S	X			X
2	0089_QC202_201214	14-12-20	W	X	X	X	
3	0089_QC203_201214	14-12-20	S	X			X
4	0089_QC204_201214	14-12-20	W	X	X	X	
5	0089_QC205_201214	14-12-20	W	X	X	X	
6	0089_QC206_201214	14-12-20	W	X	X	X	
7	0089_QC207_201214	14-12-20	W	X	X	X	
8	0089_QC208_201214	14-12-20	W	X	X	X	
9	0089_QC209_201214	14-12-20	W	X	X	X	
10	0089_QC210_201214	14-12-20	W	X	X	X	
	Total Counts						

Containers (Change container type & size if necessary)

500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)

Required Turnaround Time (TAT) Default will be 5 days if not ticked.

♦Surcharge will apply

- ☐ Overnight (reporting by 9am)♦
- ☐ Same day♦ ☐ 1 day♦
- ☐ 2 days♦ ☐ 3 days♦
- ☒ 5 days (Standard)
- ☐ Other( )

Sample Comments / Dangerous Goods Hazard Warning

Date/Time: 17/12/20 9:11

Chilled: ☐ Yes ☐ No

Temp: 10.3, 11.3, 10.6

Correction: -1.4

Final Temp: 9.4°C

Method of Shipment: ☐ Courier (#) ☐ Hand Delivered ☐ Postal

Name	Signature	Date	Time

Laboratory Use Only

Received By	[redacted]	SYD | BNE | MEL | (PER) | ADL | NTL | DRW	Signature	[redacted]	Date	17/12/20	Time	9:11
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time	

Temperature: 9.4

Report №: 765054

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

53009_10 Modified by Dr R Symons Approved by G Jackson Approved on [redacted] 20

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☐ **Sydney Laboratory** Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066 02 9900 8400 EnviroSampleNSW@eurofins.com

☐ **Brisbane Laboratory** Unit 1 21 Smallwood Place Murarrie QLD 4172 07 3902 4600 EnviroSampleQLD@eurofins.com

☐ **Perth Laboratory** Unit 2 91 Leach Highway Kewdale WA 6105 08 9251 9600 EnviroSampleWA@eurofins.com

☐ **Melbourne Laboratory** 6 Monterey Road Dandenong South VIC 3175 03 8564 5000 EnviroSampleVic@eurofins.com

Company	CARDNO	Project №	WA_0089_PFASOMP	Project Manager	[redacted]
Address	11 harvest Tce WEST PERTH	Project Name	HMAS Stirling	EDD Format ESdat, EQUIS etc	ESdat
Contact Name	[redacted]				
Phone №					
Special Directions	Please send ESdat report to derp.labreports@esdat.com.au with the project ID in the header file.				
Purchase Order	DEF19009/730				
Quote ID №					

Sampler(s)

Handed over by: ALS

Email for Invoice: [redacted]

Email for Results: [redacted]

Analyses (Where metals are required, please specify Total or Filtered. SUITE code must be used to attach SUITE pricing)

Containers (Change container type & size if necessary)

Required Turnaround Time (TAT) (Default will be 5 days if not ticked)

- ☐ Overnight (reporting by 9am)♦
- ☐ Same day♦ ☐ 1 day♦
- ☐ 2 days♦ ☐ 3 days♦
- ☒ 5 days (Standard)
- ☐ Other(

♦Surcharge will apply

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Full PFAS suite	(water) Major anions & cations	(water) TOC, TSS, TDS, pH	(sediment) TOC, CEC, pH	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	0089_QC201_201214	14-12-20	W	X	X	X										
2	0089_QC202_201215	15-12-20	W	X	X	X										
3	0089_QC203_201215	15-12-20	W	X	X	X										
4	0089_QC214_201215	15-12-20	W	X	X	X										
5	0089_QC215_201215	15-12-20	W	X	X	X										
6	0089_QC216_201216	16-12-20	W	X	X	X										
7																
8																
9																
10																
		Total Counts		16												

Method of Shipment: ☐ Courier (#) ☐ Hand Delivered ☐ Postal Name Signature Date Time

Laboratory Use Only

Received By	[redacted]	SYD | BNE | MEL | (PER) | ADL | NTL | DRW	Signature	[redacted]	Date 17/12/20	Time 9:11	Temperature 9.4
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	Time	Report № 785056

Eurofins Environment Testing Australia Pty Ltd

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions (unless agreed otherwise). A copy is available on request.

JS3009_R1 Modified by [redacted] approved by [redacted] approved on 6 August 20...

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IANZ # 1290

Sample Receipt Advice

Company name:	Cardno (WA)
Contact name:	[redacted]
Project name:	HMAS STIRLING
Project ID:	WA_0089_PFASOMP
Turnaround time:	5 Day
Date/Time received	Dec 17, 2020 9:11 AM
Eurofins reference	765054

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✗	All samples have been received as described on the above COC.
✗	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
✗	Split sample sent to requested external lab.
✗	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

2x QC209 received. No QC208 received. Please advise.

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

[redacted]

Results will be delivered electronically via email to [redacted]

Note: A copy of these results will also be delivered to the general Cardno (WA) email address.

Cardno Consulting WA
11 Harvest Terrace
West Perth
WA 6005

Attention: [redacted]

Report **765054-S**
Project name HMAS STIRLING
Project ID WA_0089_PFASOMP
Received Date Dec 17, 2020

Client Sample ID			**0089_QC201_201114**	**0089_QC203_201114**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**P20-De42451**	**P20-De42453**
Date Sampled			**Dec 14, 2020**	**Dec 14, 2020**
Test/Reference	LOR	Unit		
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	4300	4200
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	8.9	8.8
Total Organic Carbon	0.1	%	4.1	5.3
% Moisture	1	%	26	31
Cation Exchange Capacity				
Cation Exchange Capacity	0.05	meq/100g	31	30
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5	< 5
13C4-PFBA (surr.)	1	%	15	13
13C5-PFPeA (surr.)	1	%	21	19
13C5-PFHxA (surr.)	1	%	27	26
13C4-PFHpA (surr.)	1	%	37	36
13C8-PFOA (surr.)	1	%	42	40
13C5-PFNA (surr.)	1	%	45	44
13C6-PFDA (surr.)	1	%	61	58
13C2-PFUnDA (surr.)	1	%	59	57
13C2-PFDoDA (surr.)	1	%	56	50
13C2-PFTeDA (surr.)	1	%	36	34
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	5	ug/kg	< 5	< 5

Client Sample ID			0089_QC201_201114	0089_QC203_201114
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**P20-De42451**	**P20-De42453**
Date Sampled			**Dec 14, 2020**	**Dec 14, 2020**
Test/Reference	LOR	Unit		
Perfluoroalkyl sulfonamido substances				
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	5	ug/kg	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10	< 10
13C8-FOSA (surr.)	1	%	53	58
D3-N-MeFOSA (surr.)	1	%	100	106
D5-N-EtFOSA (surr.)	1	%	89	100
D7-N-MeFOSE (surr.)	1	%	58	65
D9-N-EtFOSE (surr.)	1	%	58	64
D5-N-EtFOSAA (surr.)	1	%	34	32
D3-N-MeFOSAA (surr.)	1	%	43	47
Perfluoroalkyl sulfonic acids (PFSAs)				
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	< 5
13C3-PFBS (surr.)	1	%	57	59
18O2-PFHxS (surr.)	1	%	70	69
13C8-PFOS (surr.)	1	%	80	79
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	< 5
13C2-4:2 FTS (surr.)	1	%	INT	INT
13C2-6:2 FTSA (surr.)	1	%	11	12
13C2-8:2 FTSA (surr.)	1	%	30	30
13C2-10:2 FTSA (surr.)	1	%	47	53
PFASs Summations				
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Conductivity (1:5 aqueous extract at 25°C as rec.)	Melbourne	Dec 23, 2020	7 Days
- Method: LTM-INO-4030 Conductivity			
Cation Exchange Capacity	Melbourne	Dec 24, 2020	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage			
pH (1:5 Aqueous extract at 25°C as rec.)	Melbourne	Dec 23, 2020	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Total Organic Carbon	Melbourne	Dec 24, 2020	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			
% Moisture	Melbourne	Dec 21, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Dec 24, 2020	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Dec 24, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Dec 24, 2020	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Dec 24, 2020	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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IANZ # 1290

Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 765054
Phone: [redacted]
Fax: [redacted]

Received: Dec 17, 2020 9:11 AM
Due: Dec 24, 2020
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Moisture Set	Cation Exchange Capacity	Eurofins Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs)	Eurofins Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X	X
Sydney Laboratory - NATA Site # 18217															
Brisbane Laboratory - NATA Site # 20794													X		
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory															
External Laboratory															
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**										
1	0089_QC201_201114	Dec 14, 2020		Soil	P20-De42451	X		X		X	X		X		
2	0089_QC202_201114	Dec 14, 2020		Water	P20-De42452		X	X	X			X	X	X	X
3	0089_QC203_201114	Dec 14, 2020		Soil	P20-De42453	X		X		X	X		X		
4	0089_QC204_201114	Dec 14, 2020		Water	P20-De42454		X	X	X			X	X	X	X
5	0089_QC205_201114	Dec 14, 2020		Water	P20-De42455		X	X	X			X	X	X	X
6	0089_QC206_	Dec 14, 2020		Water	P20-De42456		X	X	X			X	X	X	X

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WA 6005

Project Name: HMAS STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 765054
Phone: [redacted]
Fax: [redacted]

Received: Dec 17, 2020 9:11 AM
Due: Dec 24, 2020
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Moisture Set	Cation Exchange Capacity	Eurofins Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs)	Eurofins Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X	X
Sydney Laboratory - NATA Site # 18217															
Brisbane Laboratory - NATA Site # 20794													X		
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory															
External Laboratory															
	201114														
7	0089_QC207_201114	Dec 14, 2020		Water	P20-De42457		X	X	X			X	X	X	X
8	0089_QC209_201114 (1)	Dec 14, 2020		Water	P20-De42458		X	X	X			X	X	X	X
9	0089_QC209_201114 (2)	Dec 14, 2020		Water	P20-De42459		X	X	X			X	X	X	X
10	0089_QC210_201114	Dec 14, 2020		Water	P20-De42460		X	X	X			X	X	X	X
11	0089_QC211_201114	Dec 14, 2020		Water	P20-De42461		X	X	X			X	X	X	X
12	0089_QC212_201115	Dec 15, 2020		Water	P20-De42462		X	X	X			X	X	X	X

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Project Name: HMAS STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 765054
Phone: [redacted]
Fax: [redacted]

Received: Dec 17, 2020 9:11 AM
Due: Dec 24, 2020
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Moisture Set	Cation Exchange Capacity	Eurofins Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs)	Eurofins Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X	X
Sydney Laboratory - NATA Site # 18217															
Brisbane Laboratory - NATA Site # 20794													X		
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory															
External Laboratory															
13	0089_QC213_201115	Dec 15, 2020		Water	P20-De42463		X	X	X			X	X	X	X
14	0089_QC214_201115	Dec 15, 2020		Water	P20-De42464		X	X	X			X	X	X	X
15	0089_QC215_201115	Dec 15, 2020		Water	P20-De42465		X	X	X			X	X	X	X
16	0089_QC216_201116	Dec 16, 2020		Water	P20-De42466		X	X	X			X	X	X	X
Test Counts						2	14	16	14	2	2	14	16	14	14

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 10			10	Pass	
Total Organic Carbon	%	< 0.1			0.1	Pass	
Method Blank							
Cation Exchange Capacity							
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Conductivity (1:5 aqueous extract at 25°C as rec.)	%	95			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	93			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	100			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	106			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroheptanoic acid (PFHpA)	%	95			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	94			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	94			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	106			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	100			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	105			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	85			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	111			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	109			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	96			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	96			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	96			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	77			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	103			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	100			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	90			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	90			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	92			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	81			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	90			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	99			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	99			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	87			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	100			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	105			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	101			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	100			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	P20-De42453	CP	%	95			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	P20-De42453	CP	%	102			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	P20-De42453	CP	%	97			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	P20-De42453	CP	%	97			50-150	Pass	
Perfluorooctanoic acid (PFOA)	P20-De42453	CP	%	93			50-150	Pass	
Perfluorononanoic acid (PFNA)	P20-De42453	CP	%	104			50-150	Pass	
Perfluorodecanoic acid (PFDA)	P20-De42453	CP	%	101			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	P20-De42453	CP	%	110			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	P20-De42453	CP	%	111			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	P20-De42453	CP	%	104			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P20-De42453	CP	%	108			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	P20-De42453	CP	%	104			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P20-De42453	CP	%	99			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P20-De42453	CP	%	101			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P20-De42453	CP	%	102			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P20-De42453	CP	%	90			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P20-De42453	CP	%	105			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P20-De42453	CP	%	105			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	P20-De42453	CP	%	96			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	P20-De42453	CP	%	84			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P20-De42453	CP	%	78			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P20-De42453	CP	%	ND			50-150	Fail	
Perfluorohexanesulfonic acid (PFHxS)	P20-De42453	CP	%	89			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P20-De42453	CP	%	121			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	P20-De42453	CP	%	100			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	P20-De42453	CP	%	84			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P20-De42453	CP	%	94			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P20-De42453	CP	%	104			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P20-De42453	CP	%	95			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P20-De42453	CP	%	105			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C as rec.)	M20-De36134	NCP	uS/cm	**	**	1.6	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	M20-De36134	NCP	pH Units	**	**	pass	30%	Pass	
Total Organic Carbon	P20-De39312	NCP	%	5.0	3.1	47	30%	Fail	
% Moisture	B20-De42447	NCP	%	54	54	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorononanoic acid (PFNA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P20-De42451	CP	ug/kg	< 10	< 10	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P20-De42451	CP	ug/kg	< 10	< 10	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P20-De42451	CP	ug/kg	< 10	< 10	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P20-De42451	CP	ug/kg	< 5	< 5	<1	30%	Pass

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised By

Emily Rosenberg	Senior Analyst-Metal (VIC)
Sarah McCallion	Senior Analyst-PFAS (QLD)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

[redacted]
General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Cardno Consulting WA
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West Perth
WA 6005

Attention: [redacted]

Report **765054-W**
Project name HMAS STIRLING
Project ID WA_0089_PFASOMP
Received Date Dec 17, 2020

Client Sample ID			0089_QC202_201114	0089_QC204_201114	0089_QC205_201114	0089_QC206_201114
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**P20-De42452**	**P20-De42454**	**P20-De42455**	**P20-De42456**
Date Sampled			**Dec 14, 2020**	**Dec 14, 2020**	**Dec 14, 2020**	**Dec 14, 2020**
Test/Reference	LOR	Unit				
Chloride	1	mg/L	26000	49000	20000	20000
pH (at 25 °C)	0.1	pH Units	7.7	7.6	7.5	7.6
Sulphate (as SO4)	5	mg/L	3100	3100	3100	3100
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	34000	33000	44000	37000
Total Organic Carbon	5	mg/L				
Total Suspended Solids Dried at 103–105°C	1	mg/L	280	70	220	290
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	170	180	240	230
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	170	180	240	230
Eurofins Suite B11C: Na/K/Ca/Mg						
Calcium	0.5	mg/L	520	470	490	510
Magnesium	0.5	mg/L	1600	1500	1500	1500
Potassium	0.5	mg/L	500	450	450	470
Sodium	0.5	mg/L	12000	11000	11000	11000
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	98	98	107	88
13C5-PFPeA (surr.)	1	%	152	158	145	132
13C5-PFHxA (surr.)	1	%	117	104	116	109
13C4-PFHpA (surr.)	1	%	160	152	166	131
13C8-PFOA (surr.)	1	%	141	126	144	111
13C5-PFNA (surr.)	1	%	91	71	87	85
13C6-PFDA (surr.)	1	%	83	79	74	84

Client Sample ID			0089_QC202_201114	0089_QC204_201114	0089_QC205_201114	0089_QC206_201114
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**P20-De42452**	**P20-De42454**	**P20-De42455**	**P20-De42456**
Date Sampled			**Dec 14, 2020**	**Dec 14, 2020**	**Dec 14, 2020**	**Dec 14, 2020**
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C2-PFUnDA (surr.)	1	%	77	75	62	91
13C2-PFDoDA (surr.)	1	%	66	73	52	93
13C2-PFTeDA (surr.)	1	%	35	46	38	134
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	77	68	70	68
D3-N-MeFOSA (surr.)	1	%	118	116	104	156
D5-N-EtFOSA (surr.)	1	%	53	57	46	74
D7-N-MeFOSE (surr.)	1	%	93	97	92	125
D9-N-EtFOSE (surr.)	1	%	97	115	104	147
D5-N-EtFOSAA (surr.)	1	%	119	95	59	122
D3-N-MeFOSAA (surr.)	1	%	132	110	66	117
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	129	132	135	108
18O2-PFHxS (surr.)	1	%	117	109	124	101
13C8-PFOS (surr.)	1	%	90	84	85	87
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	127	119	117	88
13C2-6:2 FTSA (surr.)	1	%	70	63	70	54
13C2-8:2 FTSA (surr.)	1	%	50	47	47	50
13C2-10:2 FTSA (surr.)	1	%	102	93	72	113

Client Sample ID			0089_QC202_201114	0089_QC204_201114	0089_QC205_201114	0089_QC206_201114
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			P20-De42452	P20-De42454	P20-De42455	P20-De42456
Date Sampled			Dec 14, 2020	Dec 14, 2020	Dec 14, 2020	Dec 14, 2020
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			0089_QC207_201114	0089_QC209_201114 (1)	0089_QC209_201114 (2)	0089_QC210_201114
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			P20-De42457	P20-De42458	P20-De42459	P20-De42460
Date Sampled			Dec 14, 2020	Dec 14, 2020	Dec 14, 2020	Dec 14, 2020
Test/Reference	LOR	Unit				
Chloride	1	mg/L	20000	70	33000	150
pH (at 25 °C)	0.1	pH Units	7.5	7.8	7.6	8.0
Sulphate (as SO4)	5	mg/L	3100	26	3200	64
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	33000	530	33000	780
Total Organic Carbon	5	mg/L				
Total Suspended Solids Dried at 103–105°C	1	mg/L	310	690	730	240
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	150	850	150	550
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	150	850	150	550
Eurofins Suite B11C: Na/K/Ca/Mg						
Calcium	0.5	mg/L	470	77	490	74
Magnesium	0.5	mg/L	1400	29	1400	54
Potassium	0.5	mg/L	440	3.8	440	14
Sodium	0.5	mg/L	12000	62	11000	110
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	0.14	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	0.21	< 0.01	0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	1.1	< 0.01	0.02
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	0.16	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	0.67	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	94	61	80	93
13C5-PFPeA (surr.)	1	%	136	96	117	126
13C5-PFHxA (surr.)	1	%	112	65	98	100
13C4-PFHpA (surr.)	1	%	147	102	129	150
13C8-PFOA (surr.)	1	%	116	58	106	126
13C5-PFNA (surr.)	1	%	72	68	72	90
13C6-PFDA (surr.)	1	%	72	36	67	95

Client Sample ID			0089_QC207_201114	0089_QC209_201114 (1)	0089_QC209_201114 (2)	0089_QC210_201114
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			P20-De42457	P20-De42458	P20-De42459	P20-De42460
Date Sampled			Dec 14, 2020	Dec 14, 2020	Dec 14, 2020	Dec 14, 2020
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C2-PFUnDA (surr.)	1	%	61	64	64	89
13C2-PFDoDA (surr.)	1	%	55	59	56	72
13C2-PFTeDA (surr.)	1	%	37	77	80	53
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	56	55	55	83
D3-N-MeFOSA (surr.)	1	%	117	115	105	74
D5-N-EtFOSA (surr.)	1	%	54	55	51	86
D7-N-MeFOSE (surr.)	1	%	92	96	83	137
D9-N-EtFOSE (surr.)	1	%	102	124	84	63
D5-N-EtFOSAA (surr.)	1	%	65	43	83	18
D3-N-MeFOSAA (surr.)	1	%	68	46	84	18
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	0.12	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	0.03	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	0.33	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	9.0	< 0.01	[N09]0.03
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	0.64	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	11	[N09]0.02	1.4
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	123	85	106	124
18O2-PFHxS (surr.)	1	%	107	84	98	112
13C8-PFOS (surr.)	1	%	65	81	69	99
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	0.09	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	113	86	86	127
13C2-6:2 FTSA (surr.)	1	%	66	52	43	74
13C2-8:2 FTSA (surr.)	1	%	49	37	36	53
13C2-10:2 FTSA (surr.)	1	%	74	62	61	85

Client Sample ID			0089_QC207_201114	0089_QC209_201114 (1)	0089_QC209_201114 (2)	0089_QC210_201114
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			P20-De42457	P20-De42458	P20-De42459	P20-De42460
Date Sampled			Dec 14, 2020	Dec 14, 2020	Dec 14, 2020	Dec 14, 2020
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	20	0.02	1.43
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	11.67	0.02	1.4
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	20.67	0.02	1.43
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	0.09	22.4	< 0.05	1.46
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	23.4	< 0.1	1.46

Client Sample ID			0089_QC211_201114	0089_QC212_201115	0089_QC213_201115	0089_QC214_201115
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			P20-De42461	P20-De42462	P20-De42463	P20-De42464
Date Sampled			Dec 14, 2020	Dec 15, 2020	Dec 15, 2020	Dec 15, 2020
Test/Reference	LOR	Unit				
Chloride	1	mg/L	20000	21000	310	120
pH (at 25 °C)	0.1	pH Units	7.8	7.6	7.7	7.9
Sulphate (as SO4)	5	mg/L	3200	3100	71	75
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	41000	39000	860	440
Total Organic Carbon	5	mg/L				
Total Suspended Solids Dried at 103–105°C	1	mg/L	250	160	4900	140
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	150	150	3400	220
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	150	150	3400	220
Eurofins Suite B11C: Na/K/Ca/Mg						
Calcium	0.5	mg/L	500	570	120	92
Magnesium	0.5	mg/L	1500	1700	56	19
Potassium	0.5	mg/L	470	540	7.6	4.1
Sodium	0.5	mg/L	12000	9900	180	41
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.05	1.0	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	< 0.01	4.3	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	< 0.01	2.8	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	< 0.01	0.35	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01	0.28	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	72	95	52	64
13C5-PFPeA (surr.)	1	%	98	135	75	97
13C5-PFHxA (surr.)	1	%	79	101	76	96
13C4-PFHpA (surr.)	1	%	102	150	81	107
13C8-PFOA (surr.)	1	%	89	121	60	89
13C5-PFNA (surr.)	1	%	66	80	67	73
13C6-PFDA (surr.)	1	%	62	78	49	80

Client Sample ID			0089_QC211_201114	0089_QC212_201115	0089_QC213_201115	0089_QC214_201115
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			P20-De42461	P20-De42462	P20-De42463	P20-De42464
Date Sampled			Dec 14, 2020	Dec 15, 2020	Dec 15, 2020	Dec 15, 2020
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C2-PFUnDA (surr.)	1	%	70	74	58	78
13C2-PFDoDA (surr.)	1	%	59	71	48	69
13C2-PFTeDA (surr.)	1	%	87	117	67	105
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	55	67	57	71
D3-N-MeFOSA (surr.)	1	%	124	120	115	133
D5-N-EtFOSA (surr.)	1	%	58	56	52	59
D7-N-MeFOSE (surr.)	1	%	92	95	98	112
D9-N-EtFOSE (surr.)	1	%	99	103	102	110
D5-N-EtFOSAA (surr.)	1	%	58	82	16	53
D3-N-MeFOSAA (surr.)	1	%	60	78	16	51
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	< 0.01	0.34	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01	0.10	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01	[N09]0.48	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	< 0.01	3.6	[N09]0.02
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	0.10	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	< 0.01	[N09]0.59	[N09]< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	91	124	81	107
18O2-PFHxS (surr.)	1	%	85	115	90	92
13C8-PFOS (surr.)	1	%	69	83	72	90
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	0.97	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	69	101	66	59
13C2-6:2 FTSA (surr.)	1	%	36	57	37	28
13C2-8:2 FTSA (surr.)	1	%	32	46	53	37
13C2-10:2 FTSA (surr.)	1	%	68	78	51	65

Client Sample ID			0089_QC211_201114	0089_QC212_201115	0089_QC213_201115	0089_QC214_201115
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**P20-De42461**	**P20-De42462**	**P20-De42463**	**P20-De42464**
Date Sampled			**Dec 14, 2020**	**Dec 15, 2020**	**Dec 15, 2020**	**Dec 15, 2020**
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01	4.19	0.02
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	0.87	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	4.47	0.02
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05	14.23	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1	14.91	< 0.1

Client Sample ID			0089_QC215_201115	0089_QC216_201116
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**P20-De42465**	**P20-De42466**
Date Sampled			**Dec 15, 2020**	**Dec 16, 2020**
Test/Reference	LOR	Unit		
Chloride	1	mg/L	2400	74
pH (at 25 °C)	0.1	pH Units	8.1	7.9
Sulphate (as SO4)	5	mg/L	240	38
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	3600	450
Total Organic Carbon	5	mg/L		
Total Suspended Solids Dried at 103–105°C	1	mg/L	230	820
Alkalinity (speciated)				
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	480	450
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20
Total Alkalinity (as CaCO3)	20	mg/L	480	450
Eurofins Suite B11C: Na/K/Ca/Mg				
Calcium	0.5	mg/L	120	73
Magnesium	0.5	mg/L	110	30
Potassium	0.5	mg/L	54	< 5
Sodium	0.5	mg/L	1400	36
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	69	63
13C5-PFPeA (surr.)	1	%	101	96
13C5-PFHxA (surr.)	1	%	86	88
13C4-PFHpA (surr.)	1	%	108	111
13C8-PFOA (surr.)	1	%	91	93
13C5-PFNA (surr.)	1	%	75	75
13C6-PFDA (surr.)	1	%	67	73

Client Sample ID			0089_QC215_201115	0089_QC216_201116
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**P20-De42465**	**P20-De42466**
Date Sampled			**Dec 15, 2020**	**Dec 16, 2020**
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs)				
13C2-PFUnDA (surr.)	1	%	75	64
13C2-PFDoDA (surr.)	1	%	64	46
13C2-PFTeDA (surr.)	1	%	95	23
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	63	80
D3-N-MeFOSA (surr.)	1	%	144	135
D5-N-EtFOSA (surr.)	1	%	62	51
D7-N-MeFOSE (surr.)	1	%	112	114
D9-N-EtFOSE (surr.)	1	%	139	129
D5-N-EtFOSAA (surr.)	1	%	36	32
D3-N-MeFOSAA (surr.)	1	%	36	33
Perfluoroalkyl sulfonic acids (PFSAs)				
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]< 0.01	[N09]< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	100	112
18O2-PFHxS (surr.)	1	%	92	98
13C8-PFOS (surr.)	1	%	78	87
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	81	67
13C2-6:2 FTSA (surr.)	1	%	40	34
13C2-8:2 FTSA (surr.)	1	%	38	40
13C2-10:2 FTSA (surr.)	1	%	66	42

Client Sample ID			0089_QC215_201115	0089_QC216_201116
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**P20-De42465**	**P20-De42466**
Date Sampled			**Dec 15, 2020**	**Dec 16, 2020**
Test/Reference	LOR	Unit		
PFASs Summations				
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B11E: Cl/SO4/Alkalinity			
Chloride	Melbourne	Dec 22, 2020	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Sulphate (as SO4)	Melbourne	Dec 22, 2020	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Alkalinity (speciated)	Melbourne	Dec 22, 2020	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			
pH (at 25 °C)	Melbourne	Dec 22, 2020	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Total Organic Carbon	Melbourne	Jan 11, 2021	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			
Total Suspended Solids Dried at 103–105°C	Melbourne	Dec 22, 2020	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Dec 22, 2020	180 Days
- Method: LTM-MET-3010 Alkali Metals by ICP-AES			
Total Dissolved Solids Dried at 180°C ± 2°C	Melbourne	Dec 22, 2020	7 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Dec 22, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Dec 22, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Dec 22, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Dec 22, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 765054
Phone: [redacted]
Fax: [redacted]

Received: Dec 17, 2020 9:11 AM
Due: Dec 24, 2020
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Moisture Set	Cation Exchange Capacity	Eurofins Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs)	Eurofins Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X	X
Sydney Laboratory - NATA Site # 18217															
Brisbane Laboratory - NATA Site # 20794													X		
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory															
External Laboratory															
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**										
1	0089_QC201_201114	Dec 14, 2020		Soil	P20-De42451	X		X		X	X		X		
2	0089_QC202_201114	Dec 14, 2020		Water	P20-De42452		X	X	X			X	X	X	X
3	0089_QC203_201114	Dec 14, 2020		Soil	P20-De42453	X		X		X	X		X		
4	0089_QC204_201114	Dec 14, 2020		Water	P20-De42454		X	X	X			X	X	X	X
5	0089_QC205_201114	Dec 14, 2020		Water	P20-De42455		X	X	X			X	X	X	X
6	0089_QC206_	Dec 14, 2020		Water	P20-De42456		X	X	X			X	X	X	X

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Company Name: Cardno (WA)
Address: [redacted]

Project Name: HMAS STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
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Phone: [redacted]
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Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Moisture Set	Cation Exchange Capacity	Eurofins Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs)	Eurofins Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X	X
Sydney Laboratory - NATA Site # 18217															
Brisbane Laboratory - NATA Site # 20794													X		
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory															
External Laboratory															
	201114														
7	0089_QC207_201114	Dec 14, 2020		Water	P20-De42457		X	X	X			X	X	X	X
8	0089_QC209_201114 (1)	Dec 14, 2020		Water	P20-De42458		X	X	X			X	X	X	X
9	0089_QC209_201114 (2)	Dec 14, 2020		Water	P20-De42459		X	X	X			X	X	X	X
10	0089_QC210_201114	Dec 14, 2020		Water	P20-De42460		X	X	X			X	X	X	X
11	0089_QC211_201114	Dec 14, 2020		Water	P20-De42461		X	X	X			X	X	X	X
12	0089_QC212_201115	Dec 15, 2020		Water	P20-De42462		X	X	X			X	X	X	X

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Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Moisture Set	Cation Exchange Capacity	Eurofins Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs)	Eurofins Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X	X
Sydney Laboratory - NATA Site # 18217															
Brisbane Laboratory - NATA Site # 20794													X		
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory															
External Laboratory															
13	0089_QC213_201115	Dec 15, 2020		Water	P20-De42463		X	X	X			X	X	X	X
14	0089_QC214_201115	Dec 15, 2020		Water	P20-De42464		X	X	X			X	X	X	X
15	0089_QC215_201115	Dec 15, 2020		Water	P20-De42465		X	X	X			X	X	X	X
16	0089_QC216_201116	Dec 16, 2020		Water	P20-De42466		X	X	X			X	X	X	X
Test Counts						2	14	16	14	2	2	14	16	14	14

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Chloride	mg/L	< 1			1	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10			10	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Total Suspended Solids Dried at 103–105°C	mg/L	< 1			1	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Eurofins Suite B11C: Na/K/Ca/Mg							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Chloride	%	110			70-130	Pass	
Sulphate (as SO4)	%	121			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	86			70-130	Pass	
Total Organic Carbon	%	99			70-130	Pass	
Total Suspended Solids Dried at 103–105°C	%	103			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	%	70			70-130	Pass	
Carbonate Alkalinity (as CaCO3)	%	122			70-130	Pass	
Total Alkalinity (as CaCO3)	%	116			70-130	Pass	
LCS - % Recovery							
Eurofins Suite B11C: Na/K/Ca/Mg							
Calcium	%	105			80-120	Pass	
Magnesium	%	104			80-120	Pass	
Potassium	%	97			80-120	Pass	
Sodium	%	112			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	115			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	103			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	95			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	101			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	98			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	87			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	93			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	138			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	135			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	106			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	136			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	139			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	108			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	145			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	99			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	104			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	138			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	141			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	83			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	121			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	100			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	106			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	86			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	79			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	107			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	133			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	125			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	105			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	150			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	146			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Total Suspended Solids Dried at 103–105°C	B20-De47498	NCP	%	81			70-130	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Bicarbonate Alkalinity (as CaCO3)	M20-De40812	NCP	%	121			70-130	Pass	
Carbonate Alkalinity (as CaCO3)	M20-De40349	NCP	%	93			70-130	Pass	
Total Alkalinity (as CaCO3)	N20-De38479	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	P20-De42457	CP	%	113			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	P20-De42457	CP	%	99			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	P20-De42457	CP	%	104			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	P20-De42457	CP	%	101			50-150	Pass	
Perfluorooctanoic acid (PFOA)	P20-De42457	CP	%	112			50-150	Pass	
Perfluorononanoic acid (PFNA)	P20-De42457	CP	%	90			50-150	Pass	
Perfluorodecanoic acid (PFDA)	P20-De42457	CP	%	95			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	P20-De42457	CP	%	104			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	P20-De42457	CP	%	125			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	P20-De42457	CP	%	101			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P20-De42457	CP	%	125			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	P20-De42457	CP	%	123			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P20-De42457	CP	%	105			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P20-De42457	CP	%	128			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P20-De42457	CP	%	88			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P20-De42457	CP	%	87			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P20-De42457	CP	%	111			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P20-De42457	CP	%	106			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	P20-De42457	CP	%	83			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	P20-De42457	CP	%	66			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P20-De42457	CP	%	98			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoropentanesulfonic acid (PFPeS)	P20-De42457	CP	%	96			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P20-De42457	CP	%	103			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P20-De42457	CP	%	60			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	P20-De42457	CP	%	112			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	P20-De42457	CP	%	61			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P20-De42457	CP	%	113			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P20-De42457	CP	%	89			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P20-De42457	CP	%	135			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P20-De42457	CP	%	111			50-150	Pass	
Spike - % Recovery									
Eurofins Suite B11C: Na/K/Ca/Mg				Result 1					
Sodium	M20-De46862	NCP	%	106			75-125	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	P20-De42458	CP	%	117			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	P20-De42458	CP	%	132			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	P20-De42458	CP	%	89			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	P20-De42458	CP	%	136			50-150	Pass	
Perfluorooctanoic acid (PFOA)	P20-De42458	CP	%	136			50-150	Pass	
Perfluorononanoic acid (PFNA)	P20-De42458	CP	%	89			50-150	Pass	
Perfluorodecanoic acid (PFDA)	P20-De42458	CP	%	114			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	P20-De42458	CP	%	110			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	P20-De42458	CP	%	123			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	P20-De42458	CP	%	89			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P20-De42458	CP	%	132			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	P20-De42458	CP	%	123			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P20-De42458	CP	%	102			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P20-De42458	CP	%	122			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P20-De42458	CP	%	100			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P20-De42458	CP	%	87			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P20-De42458	CP	%	96			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P20-De42458	CP	%	99			50-150	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	P20-De42458	CP	%	88			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	P20-De42458	CP	%	137			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P20-De42458	CP	%	99			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P20-De42458	CP	%	99			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P20-De42458	CP	%	ND			50-150	Fail	
Perfluoroheptanesulfonic acid (PFHpS)	P20-De42458	CP	%	65			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	P20-De42458	CP	%	ND			50-150	Fail	
Perfluorodecanesulfonic acid (PFDS)	P20-De42458	CP	%	130			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P20-De42458	CP	%	113			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P20-De42458	CP	%	121			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P20-De42458	CP	%	140			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P20-De42458	CP	%	109			50-150	Pass	
Spike - % Recovery									
Eurofins Suite B11C: Na/K/Ca/Mg				Result 1					
Calcium	P20-De42461	CP	%	109			75-125	Pass	
Magnesium	P20-De42461	CP	%	105			75-125	Pass	
Potassium	P20-De42461	CP	%	105			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Chloride	P20-De35862	NCP	mg/L	17	1.7	120	30%	Fail	Q15
pH (at 25 °C)	B20-De36560	NCP	pH Units	7.3	7.3	pass	30%	Pass	
Sulphate (as SO4)	B20-De36562	NCP	mg/L	32	17	8.0	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	B20-De36560	NCP	mg/L	320	290	10	30%	Pass	
Carbonate Alkalinity (as CaCO3)	B20-De36560	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO3)	B20-De36560	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO3)	B20-De36560	NCP	mg/L	320	290	10	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	P20-De42452	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorododecanoic acid (PFDoDA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	P20-De42452	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P20-De42452	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P20-De42452	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P20-De42452	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P20-De42452	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P20-De42452	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P20-De42452	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P20-De42452	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P20-De42452	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	P20-De42454	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorodecanoic acid (PFDA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	P20-De42454	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P20-De42454	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P20-De42454	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P20-De42454	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P20-De42454	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P20-De42454	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P20-De42454	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P20-De42454	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P20-De42454	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Dissolved Solids Dried at 180°C ± 2°C	P20-De42455	CP	mg/L	44000	34000	27	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	P20-De42455	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	P20-De42455	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P20-De42455	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P20-De42455	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P20-De42455	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P20-De42455	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P20-De42455	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P20-De42455	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P20-De42455	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P20-De42455	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	P20-De42456	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	P20-De42456	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P20-De42456	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P20-De42456	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P20-De42456	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P20-De42456	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P20-De42456	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P20-De42456	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P20-De42456	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P20-De42456	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
Total Suspended Solids Dried at 103–105°C	P20-De42457	CP	mg/L	310	350	13	30%	Pass	
Duplicate									
Eurofins Suite B11C: Na/K/Ca/Mg				Result 1	Result 2	RPD			
Calcium	P20-De42461	CP	mg/L	500	480	3.0	30%	Pass	
Magnesium	P20-De42461	CP	mg/L	1500	1500	4.0	30%	Pass	
Potassium	P20-De42461	CP	mg/L	470	450	4.0	30%	Pass	
Sodium	P20-De42461	CP	mg/L	12000	11000	6.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

[redacted] Senior Analyst-Metal (VIC)
[redacted] Senior Analyst-PFAS (QLD)
[redacted] Senior Analyst-Inorganic (VIC)

[redacted]
General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013973**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Dec-2020
C-O-C number	: 17088	Issue Date	: 22-Dec-2020 16:45
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW356_201214	0089_PW331_201214	0089_QC104_201214	0089_PW329_201214	0089_QC102_201214
			Sampling date / time	14-Dec-2020 09:30	14-Dec-2020 09:50	14-Dec-2020 09:50	14-Dec-2020 11:17	14-Dec-2020 11:18
Compound	CAS Number	LOR	Unit	EP2013973-001	EP2013973-002	EP2013973-003	EP2013973-006	EP2013973-007
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.72	7.75	7.76	7.85	7.85
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	37100	34900	37000	37500	37000
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	99	47	44	146	280
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	246	142	141	134	133
Total Alkalinity as CaCO3	----	1	mg/L	246	142	141	134	133
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2780	2840	2820	2870	2840
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18900	19300	19300	19400	19200
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	504	509	512	472	461
Magnesium	7439-95-4	1	mg/L	1570	1620	1610	1550	1510
Sodium	7440-23-5	1	mg/L	12000	12300	12300	12000	11800
Potassium	7440-09-7	1	mg/L	684	703	703	616	608
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	596	606	606	610	603
ø Total Cations	----	0.01	meq/L	694	712	711	689	676
ø Ionic Balance	----	0.01	%	7.59	7.99	7.98	6.10	5.68
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	9	8	9	6	5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW356_201214	0089_PW331_201214	0089_QC104_201214	0089_PW329_201214	0089_QC102_201214
				Sampling date / time	14-Dec-2020 09:30	14-Dec-2020 09:50	14-Dec-2020 09:50	14-Dec-2020 11:17	14-Dec-2020 11:18
Compound	CAS Number	LOR	Unit		EP2013973-001	EP2013973-002	EP2013973-003	EP2013973-006	EP2013973-007
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW356_201214	0089_PW331_201214	0089_QC104_201214	0089_PW329_201214	0089_QC102_201214
				Sampling date / time	14-Dec-2020 09:30	14-Dec-2020 09:50	14-Dec-2020 09:50	14-Dec-2020 11:17	14-Dec-2020 11:18
					EP2013973-001	EP2013973-002	EP2013973-003	EP2013973-006	EP2013973-007
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**113**	**110**	**104**	**110**	**97.4**
13C8-PFOA	----	0.02	%		**107**	**108**	**105**	**108**	**104**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW150_201214	0089_SW152_201214	----	----	----
				Sampling date / time	14-Dec-2020 10:03	14-Dec-2020 10:36	----	----	----
Compound	CAS Number	LOR	Unit		EP2013973-004	EP2013973-005	--------	--------	--------
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.08	8.09	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		35200	37000	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		198	174	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		121	120	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		121	120	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2840	2810	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19400	19400	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		518	495	----	----	----
Magnesium	7439-95-4	1	mg/L		1650	1560	----	----	----
Sodium	7440-23-5	1	mg/L		12500	11900	----	----	----
Potassium	7440-09-7	1	mg/L		716	677	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		609	608	----	----	----
ø Total Cations	----	0.01	meq/L		724	688	----	----	----
ø Ionic Balance	----	0.01	%		8.62	6.16	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		3	3	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW150_201214	0089_SW152_201214	----	----	----
			Sampling date / time	14-Dec-2020 10:03	14-Dec-2020 10:36	----	----	----
Compound	CAS Number	LOR	Unit	EP2013973-004	EP2013973-005	--------	--------	--------
				Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW150_201214	0089_SW152_201214	----	----	----
				Sampling date / time	14-Dec-2020 10:03	14-Dec-2020 10:36	----	----	----
Compound	CAS Number	LOR	Unit		EP2013973-004	EP2013973-005	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**109**	**109**	----	----	----
13C8-PFOA	----	0.02	%		**110**	**108**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013973**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Dec-2020
C-O-C number	: 17088	Issue Date	: 22-Dec-2020
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3431407)									
EP2013968-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.78	7.80	0.257	0% - 20%
EP2013650-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.99	8.00	0.125	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3427659)									
EP2013984-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	29700	28300	4.82	0% - 20%
EP2013973-001	0089_PW356_201214	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37100	36000	3.03	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3427660)									
EP2013984-004	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	124	119	4.73	0% - 20%
EP2013973-001	0089_PW356_201214	EA025H: Suspended Solids (SS)	----	5	mg/L	99	62	45.2	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3431408)									
EP2014017-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	71	70	1.44	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	71	70	1.44	0% - 20%
EP2014045-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	5	4	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	5	4	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3422383)									
EP2013975-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1640	1620	1.02	0% - 20%
EP2013801-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	7	7	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3422382)									
EP2013975-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	11900	12000	1.12	0% - 20%
EP2013801-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	55	56	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426531)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3426531) - continued									
EP2013973-001	0089_PW356_201214	ED093F: Calcium	7440-70-2	1	mg/L	504	501	0.595	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1570	1560	0.566	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12000	11900	1.09	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	684	681	0.410	0% - 20%
EP2013983-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	535	528	1.21	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1650	1630	1.16	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12500	12300	1.47	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	728	712	2.15	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3422355)									
EP2013954-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.00	No Limit
EP2013973-007	0089_QC102_201214	EP005: Total Organic Carbon	----	1	mg/L	5	5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3429111)									
EP2013975-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.99	1.12	12.4	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP2013975-008	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	6.33	5.20	19.7	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.25	0.22	14.3	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.30	0.29	4.08	0% - 50%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	3.47	3.28	5.72	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.30	0.30	0.00	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3429111)									
EP2013975-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP2013975-008	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.29	0.28	6.12	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.33	0.32	0.00	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.34	1.30	2.42	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.11	0.11	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3429111) - continued									
EP2013975-008	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.1	0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3429111)									
EP2013975-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP2013975-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3429111)									
EP2013975-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3429111) - continued									
EP2013975-007	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP2013975-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.19	0.20	5.26	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3429111)									
EP2013975-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.02	1.14	11.1	0% - 20%
EP2013975-008	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	13.0	11.6	11.4	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3431407)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.5	102
				----	7 pH Unit	101	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3427659)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	104	88.1	114
				<10	1000 mg/L	108	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3427660)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	115	89.1	120
				<5	1000 mg/L	103	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3431408)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	105	81.2	126
				<1	200 mg/L	97.3	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422383)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.1	87.7	113
				<1	500 mg/L	102	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3422382)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.3	87.9	114
				<1	1000 mg/L	99.8	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426531)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.6	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.1	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.4	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.4	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3422355)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	116	87.2	116
				<1	100 mg/L	111	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429111)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	79.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	77.0	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	77.6	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	81.6	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429111) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	79.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429111)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	85.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	79.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	82.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	88.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	88.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	89.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	86.3	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429111)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	70.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	81.2	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	78.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	71.2	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	68.1	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	72.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	71.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3429111)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	80.0	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	80.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	95.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	93.0	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422383)							
EP2013801-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	111	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3422382)							
EP2013801-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	97.2	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3422355)							
EP2013964-004	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	112	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429111)							
EP2013975-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	77.3	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	77.2	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	80.5	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	74.2	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	# Not Determined	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	80.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429111)							
EP2013975-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	84.5	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	85.2	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	80.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	79.6	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	86.2	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	90.0	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	87.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	92.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	87.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	95.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	105	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429111)							
EP2013975-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	77.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	69.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	72.1	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	67.7	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	67.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	77.6	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	79.0	61.0	135

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3429111)							
EP2013975-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	99.8	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	80.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	99.2	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	90.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013973**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 22-Dec-2020
Sampler	: [redacted]	No. of samples received	: 7
Order number	: DEF19009/730	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2013975--006	Anonymous	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_PW356_201214,	0089_PW331_201214,	----	----	----	19-Dec-2020	14-Dec-2020	**5**
0089_QC104_201214,	0089_SW150_201214,						
0089_SW152_201214,	0089_PW329_201214,						
0089_QC102_201214							

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_PW356_201214,	0089_PW331_201214,	**14-Dec-2020**	**----**	----	----	**19-Dec-2020**	14-Dec-2020	×
0089_QC104_201214,	0089_SW150_201214,							
0089_SW152_201214,	0089_PW329_201214,							
0089_QC102_201214								
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_PW356_201214,	0089_PW331_201214,	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
0089_QC104_201214,	0089_SW150_201214,							
0089_SW152_201214,	0089_PW329_201214,							
0089_QC102_201214								

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_PW356_201214, 0089_PW331_201214, 0089_QC104_201214, 0089_SW150_201214, 0089_SW152_201214, 0089_PW329_201214, 0089_QC102_201214	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_PW356_201214, 0089_PW331_201214, 0089_QC104_201214, 0089_SW150_201214, 0089_SW152_201214, 0089_PW329_201214, 0089_QC102_201214	**14-Dec-2020**	**----**	----	----	**19-Dec-2020**	28-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_PW356_201214, 0089_PW331_201214, 0089_QC104_201214, 0089_SW150_201214, 0089_SW152_201214, 0089_PW329_201214, 0089_QC102_201214	**14-Dec-2020**	**----**	----	----	**16-Dec-2020**	11-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW356_201214, 0089_PW331_201214, 0089_QC104_201214, 0089_SW150_201214, 0089_SW152_201214, 0089_PW329_201214, 0089_QC102_201214	**14-Dec-2020**	**----**	----	----	**16-Dec-2020**	11-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_PW356_201214, 0089_PW331_201214, 0089_QC104_201214, 0089_SW150_201214, 0089_SW152_201214, 0089_PW329_201214, 0089_QC102_201214	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW356_201214, 0089_PW331_201214, 0089_QC104_201214, 0089_SW150_201214, 0089_SW152_201214, 0089_PW329_201214, 0089_QC102_201214	**14-Dec-2020**	**----**	----	----	**15-Dec-2020**	11-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW356_201214, 0089_PW331_201214, 0089_QC104_201214, 0089_SW150_201214, 0089_SW152_201214, 0089_PW329_201214, 0089_QC102_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW356_201214, 0089_PW331_201214, 0089_QC104_201214, 0089_SW150_201214, 0089_SW152_201214, 0089_PW329_201214, 0089_QC102_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW356_201214, 0089_PW331_201214, 0089_QC104_201214, 0089_SW150_201214, 0089_SW152_201214, 0089_PW329_201214, 0089_QC102_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW356_201214, 0089_PW331_201214, 0089_QC104_201214, 0089_SW150_201214, 0089_SW152_201214, 0089_PW329_201214, 0089_QC102_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW356_201214, 0089_PW331_201214, 0089_QC104_201214, 0089_SW150_201214, 0089_SW152_201214, 0089_PW329_201214, 0089_QC102_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	17	**5.88**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013973**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17088	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2013973-001	14-Dec-2020 09:30	0089_PW356_201214	✓	✓	✓	✓	✓	✓	✓
EP2013973-002	14-Dec-2020 09:50	0089_PW331_201214	✓	✓	✓	✓	✓	✓	✓
EP2013973-003	14-Dec-2020 09:50	0089_QC104_201214	✓	✓	✓	✓	✓	✓	✓
EP2013973-004	14-Dec-2020 10:03	0089_SW150_201214	✓	✓	✓	✓	✓	✓	✓
EP2013973-005	14-Dec-2020 10:36	0089_SW152_201214	✓	✓	✓	✓	✓	✓	✓
EP2013973-006	14-Dec-2020 11:17	0089_PW329_201214	✓	✓	✓	✓	✓	✓	✓
EP2013973-007	14-Dec-2020 11:18	0089_QC102_201214	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2013973-001	14-Dec-2020 09:30	0089_PW356_201214	✓
EP2013973-002	14-Dec-2020 09:50	0089_PW331_201214	✓
EP2013973-003	14-Dec-2020 09:50	0089_QC104_201214	✓
EP2013973-004	14-Dec-2020 10:03	0089_SW150_201214	✓
EP2013973-005	14-Dec-2020 10:36	0089_SW152_201214	✓
EP2013973-006	14-Dec-2020 11:17	0089_PW329_201214	✓
EP2013973-007	14-Dec-2020 11:18	0089_QC102_201214	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

ALS COC#: 17088 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 14/12/20 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? (Yes) No N/A

Random Sample Temperature on Receipt: 10.3 °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW356		14/12/2020 09:30 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW331		14/12/2020 09:50 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_QC104		14/12/2020 09:50 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_SW150		14/12/2020 10:03 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_SW152		14/12/2020 10:36 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_PW329		14/12/2020 11:17 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_QC102		14/12/2020 11:18 AM	Water	ALS: 4 Non ALS: 0	No	X	X		

Environmental Division Perth

Work Order Reference

EP2013973

Telephone : + 61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 17088 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW356	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW331	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_QC104	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW150	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_SW152	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **17088** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW329	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 17088 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW356	Clear Plastic Bottle - Natural	250 mL	00070719041813	Green	No	
001	0089_PW356	HDPE (no PTFE)	20 mL	00350019170861	Grey	No	
001	0089_PW356	HDPE (no PTFE)	20 mL	00350019170929	Grey	No	
001	0089_PW356	Amber TOC Vial - Sulfuric Acid	40 mL	00180220022266	Purple	No	
002	0089_PW331	Clear Plastic Bottle - Natural	250 mL	00070719041825	Green	No	
002	0089_PW331	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049180	Purple	No	
002	0089_PW331	HDPE (no PTFE)	20 mL	00350019170755	Grey	No	
002	0089_PW331	HDPE (no PTFE)	20 mL	00350019170557	Grey	No	
003	0089_QC104	HDPE (no PTFE)	20 mL	00350019171059	Grey	No	
003	0089_QC104	HDPE (no PTFE)	20 mL	00350019170576	Grey	No	
003	0089_QC104	Clear Plastic Bottle - Natural	250 mL	00070719041842	Green	No	
003	0089_QC104	Amber TOC Vial - Sulfuric Acid	40 mL	00180220022217	Purple	No	
004	0089_SW150	Clear Plastic Bottle - Natural	250 mL	00070719041824	Green	No	
004	0089_SW150	HDPE (no PTFE)	20 mL	00350019170810	Grey	No	
004	0089_SW150	HDPE (no PTFE)	20 mL	00350019170650	Grey	No	
004	0089_SW150	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049310	Purple	No	
005	0089_SW152	Clear Plastic Bottle - Natural	250 mL	00070719041857	Green	No	
005	0089_SW152	HDPE (no PTFE)	20 mL	00350019171064	Grey	No	
005	0089_SW152	HDPE (no PTFE)	20 mL	00350019170899	Grey	No	
005	0089_SW152	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049188	Purple	No	
006	0089_PW329	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049304	Purple	No	
006	0089_PW329	HDPE (no PTFE)	20 mL	00350019170472	Grey	No	
006	0089_PW329	HDPE (no PTFE)	20 mL	00350019170470	Grey	No	
006	0089_PW329	Clear Plastic Bottle - Natural	250 mL	00070719041832	Green	No	
007	0089_QC102	HDPE (no PTFE)	20 mL	00350019170716	Grey	No	
007	0089_QC102	HDPE (no PTFE)	20 mL	00350019170669	Grey	No	

CHAIN OF CUSTODY

COC#: **17088** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_QC102	Clear Plastic Bottle - Natural	250 mL	00070719041849	Green	No	
007	0089_QC102	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049199	Purple	No	

Total Bottle Count: ALS: 28, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013974**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17090	Issue Date	: 24-Dec-2020 11:52
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD356_201214	0089_SD331_201214	0089_QC103_201214	0089_SD357_201214	0089_SD329_201214
				Sampling date / time	14-Dec-2020 09:34	14-Dec-2020 09:53	14-Dec-2020 09:53	14-Dec-2020 11:09	14-Dec-2020 11:14
					EP2013974-001	EP2013974-002	EP2013974-003	EP2013974-004	EP2013974-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**8.8**	**9.0**	**9.0**	**9.1**	**9.1**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**4590**	**4430**	**4540**	**3710**	**4360**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**33.3**	**29.6**	**33.5**	**24.8**	**31.3**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**4.7**	**2.1**	**3.2**	**3.2**	**3.9**
Exchangeable Magnesium	----	0.1	meq/100g		**0.5**	**0.3**	**0.4**	**0.4**	**0.5**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		**0.2**	**0.1**	**0.2**	**0.2**	**0.2**
Cation Exchange Capacity	----	0.1	meq/100g		**5.4**	**2.5**	**3.9**	**3.8**	**4.5**
Exchangeable Sodium Percent	----	0.1	%		**3.4**	**4.6**	**4.4**	**4.4**	**3.3**
EP004: Organic Matter									
Organic Matter	----	0.5	%		<0.5	**0.9**	<0.5	<0.5	<0.5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD356_201214	0089_SD331_201214	0089_QC103_201214	0089_SD357_201214	0089_SD329_201214
				Sampling date / time	14-Dec-2020 09:34	14-Dec-2020 09:53	14-Dec-2020 09:53	14-Dec-2020 11:09	14-Dec-2020 11:14
Compound	CAS Number	LOR	Unit		EP2013974-001	EP2013974-002	EP2013974-003	EP2013974-004	EP2013974-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD356_201214	0089_SD331_201214	0089_QC103_201214	0089_SD357_201214	0089_SD329_201214
				Sampling date / time	14-Dec-2020 09:34	14-Dec-2020 09:53	14-Dec-2020 09:53	14-Dec-2020 11:09	14-Dec-2020 11:14
					EP2013974-001	EP2013974-002	EP2013974-003	EP2013974-004	EP2013974-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**104**	**105**	**99.0**	**110**	**106**
13C8-PFOA	----	0.0002	%		**111**	**108**	**106**	**110**	**106**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_QC101_201214	----	----	----	----
			Sampling date / time	14-Dec-2020 11:15	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2013974-006	--------	--------	--------	--------
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.0**	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**4790**	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**36.9**	----	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**3.0**	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.4**	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**3.6**	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**4.3**	----	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_QC101_201214	----	----	----	----
				Sampling date / time	14-Dec-2020 11:15	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2013974-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)				Sample ID	**0089_QC101_201214**	----	----	----	----
				Sampling date / time	14-Dec-2020 11:15	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2013974-006**	--------	--------	--------	--------
					Result	----	----	----	----
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**108**	----	----	----	----
13C8-PFOA	----	0.0002	%		**100**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013974**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17090	Issue Date	: 24-Dec-2020
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3423333)									
EP2013974-001	0089_SD356_201214	EA002: pH Value	----	0.1	pH Unit	8.8	9.0	1.24	0% - 20%
EP2013987-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.1	9.1	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3423332)									
EP2013974-001	0089_SD356_201214	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	4590	4420	3.77	0% - 20%
EP2013987-002	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3480	3380	2.92	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3423336)									
EP2013974-001	0089_SD356_201214	EA055: Moisture Content	----	0.1	%	33.3	34.0	1.84	0% - 20%
EP2013987-002	Anonymous	EA055: Moisture Content	----	0.1	%	22.1	24.5	10.2	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3423327)									
EP2013974-001	0089_SD356_201214	ED008: Exchangeable Sodium Percent	----	0.1	%	3.4	3.4	0.00	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	4.7	5.3	12.2	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.6	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	5.4	6.1	12.1	0% - 20%
EP2013987-002	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	4.0	3.6	12.3	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	3.4	3.7	6.95	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.5	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	4.1	4.4	6.22	0% - 20%
EP004: Organic Matter (QC Lot: 3423328)									
EP2013974-001	0089_SD356_201214	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit
EP2013987-003	Anonymous	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	0.0004	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP2013986-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP2013986-002	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3428177) - continued									
EP2013944-021	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2013986-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2013986-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3423333)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3423332)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
ED008: Exchangeable Cations (QCLot: 3423327)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	87.6	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	86.9	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	97.6	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	95.2	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	88.1	79.9	110
EP004: Organic Matter (QCLot: 3423328)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	102	70.0	120
				<0.5	85 %	94.0	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3428177)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	80.4	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	125	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.0	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	125	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	117	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3428177)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	97.2	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	95.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	99.2	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	78.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	94.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	96.0	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	96.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	94.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	86.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	102	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	108	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	99.6	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	99.6	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	92.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	93.6	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177) - continued							
EP2013944-021	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	110	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	102	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	121	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	78.5	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	94.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	99.8	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	86.8	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	77.1	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	125	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	86.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	87.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	93.2	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	99.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	105	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	110	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013974**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted]	No. of samples received	: 6
Order number	: DEF19009/730	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD356_201214, 0089_SD331_201214, 0089_QC103_201214, 0089_SD357_201214, 0089_SD329_201214, 0089_QC101_201214	**14-Dec-2020**	**16-Dec-2020**	21-Dec-2020	✓	**16-Dec-2020**	16-Dec-2020	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD356_201214, 0089_SD331_201214, 0089_QC103_201214, 0089_SD357_201214, 0089_SD329_201214, 0089_QC101_201214	**14-Dec-2020**	**16-Dec-2020**	21-Dec-2020	✓	**16-Dec-2020**	13-Jan-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD356_201214, 0089_SD331_201214, 0089_QC103_201214, 0089_SD357_201214, 0089_SD329_201214, 0089_QC101_201214	**14-Dec-2020**	**----**	----	----	**16-Dec-2020**	28-Dec-2020	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD356_201214, 0089_SD331_201214, 0089_QC103_201214, 0089_SD357_201214, 0089_SD329_201214, 0089_QC101_201214	**14-Dec-2020**	**17-Dec-2020**	11-Jan-2021	✓	**17-Dec-2020**	11-Jan-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD356_201214, 0089_SD331_201214, 0089_QC103_201214, 0089_SD357_201214, 0089_SD329_201214, 0089_QC101_201214	**14-Dec-2020**	**18-Dec-2020**	11-Jan-2021	✓	**18-Dec-2020**	11-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD356_201214, 0089_SD331_201214, 0089_QC103_201214, 0089_SD357_201214, 0089_SD329_201214, 0089_QC101_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD356_201214, 0089_SD331_201214, 0089_QC103_201214, 0089_SD357_201214, 0089_SD329_201214, 0089_QC101_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD356_201214, 0089_SD331_201214, 0089_QC103_201214, 0089_SD357_201214, 0089_SD329_201214, 0089_QC101_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD356_201214, 0089_SD331_201214, 0089_QC103_201214, 0089_SD357_201214, 0089_SD329_201214, 0089_QC101_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD356_201214, 0089_SD331_201214, 0089_QC103_201214, 0089_SD357_201214, 0089_SD329_201214, 0089_QC101_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
Sample Extraction for PFAS in solid matrices	ORG73	SOIL	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013974**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17090	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 6 / 6

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2013974-001	14-Dec-2020 09:34	0089_SD356_201214	✓	✓	✓	✓
EP2013974-002	14-Dec-2020 09:53	0089_SD331_201214	✓	✓	✓	✓
EP2013974-003	14-Dec-2020 09:53	0089_QC103_201214	✓	✓	✓	✓
EP2013974-004	14-Dec-2020 11:09	0089_SD357_201214	✓	✓	✓	✓
EP2013974-005	14-Dec-2020 11:14	0089_SD329_201214	✓	✓	✓	✓
EP2013974-006	14-Dec-2020 11:15	0089_QC101_201214	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ENMRG (ENMRG) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

COC#: **17090** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 14/12/20 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? (Yes) No N/A

Random Sample Temperature on Receipt: 10.3 °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD356		14/12/2020 09:34 AM	Soil	ALS: 2 Non ALS: 0	No	X		
002	0089_SD331		14/12/2020 09:53 AM	Soil	ALS: 2 Non ALS: 0	No	X		
003	0089_QC103		14/12/2020 09:53 AM	Soil	ALS: 2 Non ALS: 0	No	X		
004	0089_SD357		14/12/2020 11:09 AM	Soil	ALS: 2 Non ALS: 0	No	X		
005	0089_SD329		14/12/2020 11:14 AM	Soil	ALS: 2 Non ALS: 0	No	X		
006	0089_QC101		14/12/2020 11:15 AM	Soil	ALS: 2 Non ALS: 0	No	X		

Environmental Division
Perth
Work Order Reference
EP2013974

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: **17090** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SED

ORDER NO: DEF19009/730

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD356	HDPE Soil Jar	200 mL	00620719068436	Grey	No	
001	0089_SD356	Soil Glass Jar - Unpreserved	150 mL	00260220067576	Orange	No	
002	0089_SD331	HDPE Soil Jar	200 mL	00620719068317	Grey	No	
002	0089_SD331	Soil Glass Jar - Unpreserved	150 mL	00260220067553	Orange	No	
003	0089_QC103	HDPE Soil Jar	200 mL	00620719068434	Grey	No	
003	0089_QC103	Soil Glass Jar - Unpreserved	150 mL	00260220067609	Orange	No	
004	0089_SD357	Soil Glass Jar - Unpreserved	150 mL	00260220067588	Orange	No	
004	0089_SD357	HDPE Soil Jar	200 mL	00620719068367	Grey	No	
005	0089_SD329	Soil Glass Jar - Unpreserved	150 mL	00260220067602	Orange	No	
005	0089_SD329	HDPE Soil Jar	200 mL	00620719068308	Grey	No	
006	0089_QC101	Soil Glass Jar - Unpreserved	150 mL	00260220067568	Orange	No	
006	0089_QC101	HDPE Soil Jar	200 mL	00620719068397	Grey	No	

Total Bottle Count: ALS: 12, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013975**	Page	: 1 of 13
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Dec-2020
C-O-C number	: 17098	Issue Date	: 24-Dec-2020 12:40
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 16		
No. of samples analysed	: 15		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EA025H: Suspended Solids results for #6 and #7 have been confirmed by re-preparation and re-analysis. Different sediment loads observed in each sample.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW137_201214	0089_MW142_201214	0089_MW141_201214	0089_MW268_201214	0089_MW269_201214
				Sampling date / time	14-Dec-2020 10:19	14-Dec-2020 10:50	14-Dec-2020 11:39	14-Dec-2020 12:32	14-Dec-2020 12:42
Compound	CAS Number	LOR	Unit		EP2013975-001	EP2013975-002	EP2013975-003	EP2013975-004	EP2013975-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.54	7.69	7.68	7.82	7.93
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		37200	22900	18700	6000	900
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		112	352	961	300	644
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		444	331	346	436	390
Total Alkalinity as CaCO3	----	1	mg/L		444	331	346	436	390
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2800	1640	1260	664	76
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		18500	11900	9590	2780	284
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		597	412	396	197	73
Magnesium	7439-95-4	1	mg/L		1530	948	732	273	52
Sodium	7440-23-5	1	mg/L		11500	6860	5230	1710	190
Potassium	7440-09-7	1	mg/L		672	369	280	91	16
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		589	376	304	101	17.4
ø Total Cations	----	0.01	meq/L		673	406	315	109	16.6
ø Ionic Balance	----	0.01	%		6.66	3.83	1.78	3.83	2.32
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		14	12	14	14	17
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.05	0.59	0.03	0.04
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.11	1.06	0.04	0.06
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	3.21	10.3	0.20	0.30
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	0.11	1.01	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW137_201214	0089_MW142_201214	0089_MW141_201214	0089_MW268_201214	0089_MW269_201214
				Sampling date / time	14-Dec-2020 10:19	14-Dec-2020 10:50	14-Dec-2020 11:39	14-Dec-2020 12:32	14-Dec-2020 12:42
Compound	CAS Number	LOR	Unit		EP2013975-001	EP2013975-002	EP2013975-003	EP2013975-004	EP2013975-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**2.40**	**39.8**	<0.01	**0.35**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	**0.2**	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.11**	**1.04**	<0.02	**0.02**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**1.27**	**9.09**	**0.03**	**0.08**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.04**	**0.31**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.24**	**1.10**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW137_201214	0089_MW142_201214	0089_MW141_201214	0089_MW268_201214	0089_MW269_201214
				Sampling date / time	14-Dec-2020 10:19	14-Dec-2020 10:50	14-Dec-2020 11:39	14-Dec-2020 12:32	14-Dec-2020 12:42
Compound	CAS Number	LOR	Unit		EP2013975-001	EP2013975-002	EP2013975-003	EP2013975-004	EP2013975-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**7.54**	**64.5**	**0.30**	**0.85**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**5.61**	**50.1**	**0.20**	**0.65**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**7.32**	**62.4**	**0.26**	**0.79**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**107**	**100**	**97.7**	**104**	**101**
13C8-PFOA	----	0.02	%		**110**	**104**	**108**	**106**	**104**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW264_201214	0089_QC110_201214	0089_MW256_201214	----	----
			Sampling date / time	14-Dec-2020 13:14	14-Dec-2020 13:15	14-Dec-2020 13:54	----	----
Compound	CAS Number	LOR	Unit	EP2013975-006	EP2013975-007	EP2013975-008	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.92**	**7.97**	**7.85**	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**634**	**636**	**650**	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**265**	**140**	**316**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**440**	**406**	**321**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**440**	**406**	**321**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**66**	**66**	**35**	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**105**	**104**	**181**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**95**	**98**	**126**	----	----
Magnesium	7439-95-4	1	mg/L	**48**	**49**	**18**	----	----
Sodium	7440-23-5	1	mg/L	**90**	**89**	**103**	----	----
Potassium	7440-09-7	1	mg/L	**17**	**17**	**4**	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**13.1**	**12.4**	**12.2**	----	----
ø Total Cations	----	0.01	meq/L	**13.0**	**13.2**	**12.4**	----	----
ø Ionic Balance	----	0.01	%	**0.33**	**3.16**	**0.42**	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**10**	**9**	**5**	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	**0.25**	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	**0.30**	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.03**	**0.03**	**3.47**	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	**0.30**	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW264_201214	0089_QC110_201214	0089_MW256_201214	----	----
				Sampling date / time	14-Dec-2020 13:14	14-Dec-2020 13:15	14-Dec-2020 13:54	----	----
Compound	CAS Number	LOR	Unit		EP2013975-006	EP2013975-007	EP2013975-008	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**1.38**	**0.99**	**6.33**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	**0.1**	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	**0.33**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**1.34**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**0.11**	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.29**	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	**0.03**	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW264_201214	0089_QC110_201214	0089_MW256_201214	----	----
				Sampling date / time	14-Dec-2020 13:14	14-Dec-2020 13:15	14-Dec-2020 13:54	----	----
Compound	CAS Number	LOR	Unit		EP2013975-006	EP2013975-007	EP2013975-008	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	**0.19**	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**1.41**	**1.02**	**13.0**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**1.41**	**1.02**	**9.80**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**1.41**	**1.02**	**12.4**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	**91.7**	**98.9**	----	----
13C8-PFOA	----	0.02	%		**106**	**105**	**104**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_QC301_201214	0089_QC401_201214	0089_QC302_201214	0089_QC402_201214	0089_QC303_201214
				Sampling date / time	14-Dec-2020 14:04	14-Dec-2020 14:05	14-Dec-2020 14:05	14-Dec-2020 14:06	14-Dec-2020 14:07
Compound	CAS Number	LOR	Unit		EP2013975-009	EP2013975-010	EP2013975-011	EP2013975-012	EP2013975-013
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_QC301_201214	0089_QC401_201214	0089_QC302_201214	0089_QC402_201214	0089_QC303_201214
				Sampling date / time	14-Dec-2020 14:04	14-Dec-2020 14:05	14-Dec-2020 14:05	14-Dec-2020 14:06	14-Dec-2020 14:07
Compound	CAS Number	LOR	Unit		EP2013975-009	EP2013975-010	EP2013975-011	EP2013975-012	EP2013975-013
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	**104**	**101**	**105**	**111**
13C8-PFOA	----	0.02	%		**106**	**105**	**109**	**108**	**104**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_QC403_201214	0089_QC304_201214	----	----	----
				Sampling date / time	14-Dec-2020 14:07	14-Dec-2020 14:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2013975-014	EP2013975-015	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_QC403_201214	0089_QC304_201214	----	----	----
				Sampling date / time	14-Dec-2020 14:07	14-Dec-2020 14:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2013975-014	EP2013975-015	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		107	107	----	----	----
13C8-PFOA	----	0.02	%		107	104	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013975**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Dec-2020
C-O-C number	: 17098	Issue Date	: 24-Dec-2020
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 16		
No. of samples analysed	: 15		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3433849)									
EP2013975-006	0089_MW264_201214	EA005-P: pH Value	----	0.01	pH Unit	7.92	7.93	0.126	0% - 20%
EP2013984-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.59	7.61	0.263	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3427646)									
EP2013985-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	38900	39000	0.308	0% - 20%
EP2013975-001	0089_MW137_201214	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37200	34200	8.51	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3427647)									
EP2013985-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	418	358	15.4	0% - 20%
EP2013975-001	0089_MW137_201214	EA025H: Suspended Solids (SS)	----	5	mg/L	112	# 144	25.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3433848)									
EP2013975-006	0089_MW264_201214	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	440	407	7.67	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	440	407	7.67	0% - 20%
EP2013984-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	342	342	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	342	342	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3422383)									
EP2013975-002	0089_MW142_201214	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1640	1620	1.02	0% - 20%
EP2013801-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	7	7	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3422382)									
EP2013975-002	0089_MW142_201214	ED045G: Chloride	16887-00-6	1	mg/L	11900	12000	1.12	0% - 20%
EP2013801-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	55	56	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426587)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3426587) - continued									
EP2013975-001	0089_MW137_201214	ED093F: Calcium	7440-70-2	1	mg/L	597	632	5.82	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1530	1620	6.13	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11500	12400	7.05	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	672	727	7.86	0% - 20%
EP2013985-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	539	525	2.74	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1660	1630	1.53	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12700	12600	0.441	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	712	700	1.61	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3422355)									
EP2013954-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.00	No Limit
EP2013973-007	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3429111)									
EP2013975-007	0089_QC110_201214	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.99	1.12	12.4	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP2013975-008	0089_MW256_201214	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	6.33	5.20	19.7	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.25	0.22	14.3	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.30	0.29	4.08	0% - 50%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	3.47	3.28	5.72	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.30	0.30	0.00	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	3.86	3.76	2.74	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.66	1.69	1.48	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.27	0.25	7.13	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3429111)									
EP2013975-007	0089_QC110_201214	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3429111) - continued									
EP2013975-007	0089_QC110_201214	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP2013975-008	0089_MW256_201214	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.29	0.28	6.12	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.33	0.32	0.00	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.34	1.30	2.42	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.11	0.11	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.1	0.1	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.12	0.12	0.00	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.15	0.14	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3429111)									
EP2013975-007	0089_QC110_201214	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3429111) - continued									
EP2013975-007	0089_QC110_201214	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP2013975-008	0089_MW256_201214	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3429111)									
EP2013975-007	0089_QC110_201214	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP2013975-008	0089_MW256_201214	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3429111) - continued									
EP2013975-008	0089_MW256_201214	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.19	0.20	5.26	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3429111)									
EP2013975-007	0089_QC110_201214	EP231X: Sum of PFAS	----	0.01	µg/L	1.02	1.14	11.1	0% - 20%
EP2013975-008	0089_MW256_201214	EP231X: Sum of PFAS	----	0.01	µg/L	13.0	11.6	11.4	0% - 20%
EP231P: PFAS Sums (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	6.16	6.05	1.80	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3433849)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3427646)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114
				<10	1000 mg/L	100	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3427647)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	93.0	89.1	120
				<5	1000 mg/L	92.0	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3433848)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	108	81.2	126
				<1	200 mg/L	98.3	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422383)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.1	87.7	113
				<1	500 mg/L	102	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3422382)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.3	87.9	114
				<1	1000 mg/L	99.8	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426587)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.9	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.3	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3422355)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	116	87.2	116
				<1	100 mg/L	111	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429111)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	79.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	77.0	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	77.6	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	81.6	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429111) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	79.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429909)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	89.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	103	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	86.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	95.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429111)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	85.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	79.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	82.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	88.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	88.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	89.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	86.3	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429909)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	84.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	82.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	79.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	94.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	86.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	87.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	81.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	83.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	85.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	82.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429111)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	70.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	81.2	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	78.6	62.6	147

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429111) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	71.2	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	68.1	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	72.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	71.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429909)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	85.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	92.1	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	81.2	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	81.9	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	79.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	84.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	81.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3429111)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	80.0	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	80.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	95.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	93.0	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3429909)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	113	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	81.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	123	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	115	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422383)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422383) - continued							
EP2013801-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	111	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3422382)							
EP2013801-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	97.2	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3422355)							
EP2013964-004	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	112	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429111)							
EP2013975-006	0089_MW264_201214	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	77.3	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	77.2	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	80.5	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	74.2	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	# Not Determined	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	80.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429111)							
EP2013975-006	0089_MW264_201214	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	84.5	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	85.2	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	80.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	79.6	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	86.2	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	90.0	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	87.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	92.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	87.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	95.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	105	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429111)							
EP2013975-006	0089_MW264_201214	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	77.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	69.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	72.1	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	67.7	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	67.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	77.6	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	79.0	61.0	135

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3429111)							
EP2013975-006	0089_MW264_201214	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	99.8	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	80.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	99.2	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	90.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013975**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted]	No. of samples received	: 16
Order number	: DEF19009/730	No. of samples analysed	: 15

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EA025: Total Suspended Solids dried at 104 ± 2°C	EP2013975--001	0089_MW137_201214	**Suspended Solids (SS)**	----	25.0 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2013975--006	0089_MW264_201214	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW137_201214,	0089_MW142_201214,	----	----	----	21-Dec-2020	14-Dec-2020	**7**
0089_MW141_201214,	0089_MW268_201214,						
0089_MW269_201214,	0089_MW264_201214,						
0089_QC110_201214,	0089_MW256_201214						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	3	37	8.11	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	37	2.70	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW137_201214, 0089_MW142_201214, 0089_MW141_201214, 0089_MW268_201214, 0089_MW269_201214, 0089_MW264_201214, 0089_QC110_201214, 0089_MW256_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	14-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW137_201214, 0089_MW142_201214, 0089_MW141_201214, 0089_MW268_201214, 0089_MW269_201214, 0089_MW264_201214, 0089_QC110_201214, 0089_MW256_201214	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW137_201214, 0089_MW142_201214, 0089_MW141_201214, 0089_MW268_201214, 0089_MW269_201214, 0089_MW264_201214, 0089_QC110_201214, 0089_MW256_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	21-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW137_201214, 0089_MW142_201214, 0089_MW141_201214, 0089_MW268_201214, 0089_MW269_201214, 0089_MW264_201214, 0089_QC110_201214, 0089_MW256_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	28-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW137_201214, 0089_MW142_201214, 0089_MW141_201214, 0089_MW268_201214, 0089_MW269_201214, 0089_MW264_201214, 0089_QC110_201214, 0089_MW256_201214	**14-Dec-2020**	**----**	----	----	**16-Dec-2020**	11-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW137_201214, 0089_MW142_201214, 0089_MW141_201214, 0089_MW268_201214, 0089_MW269_201214, 0089_MW264_201214, 0089_QC110_201214, 0089_MW256_201214	**14-Dec-2020**	**----**	----	----	**16-Dec-2020**	11-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW137_201214, 0089_MW142_201214, 0089_MW141_201214, 0089_MW268_201214, 0089_MW269_201214, 0089_MW264_201214, 0089_QC110_201214, 0089_MW256_201214	**14-Dec-2020**	**----**	----	----	**17-Dec-2020**	21-Dec-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW137_201214, 0089_MW142_201214, 0089_MW141_201214, 0089_MW268_201214, 0089_MW269_201214, 0089_MW264_201214, 0089_QC110_201214, 0089_MW256_201214	**14-Dec-2020**	**----**	----	----	**15-Dec-2020**	11-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW137_201214, 0089_MW142_201214, 0089_MW141_201214, 0089_MW268_201214, 0089_MW269_201214, 0089_MW264_201214, 0089_QC110_201214, 0089_MW256_201214, 0089_QC301_201214, 0089_QC401_201214, 0089_QC302_201214, 0089_QC402_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC303_201214, 0089_QC403_201214, 0089_QC304_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW137_201214, 0089_MW142_201214, 0089_MW141_201214, 0089_MW268_201214, 0089_MW269_201214, 0089_MW264_201214, 0089_QC110_201214, 0089_MW256_201214, 0089_QC301_201214, 0089_QC401_201214, 0089_QC302_201214, 0089_QC402_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC303_201214, 0089_QC403_201214, 0089_QC304_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW137_201214, 0089_MW142_201214, 0089_MW141_201214, 0089_MW268_201214, 0089_MW269_201214, 0089_MW264_201214, 0089_QC110_201214, 0089_MW256_201214, 0089_QC301_201214, 0089_QC401_201214, 0089_QC302_201214, 0089_QC402_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC303_201214, 0089_QC403_201214, 0089_QC304_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW137_201214, 0089_MW141_201214, 0089_MW269_201214, 0089_QC110_201214, 0089_QC301_201214, 0089_QC302_201214,	0089_MW142_201214, 0089_MW268_201214, 0089_MW264_201214, 0089_MW256_201214, 0089_QC401_201214, 0089_QC402_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC303_201214, 0089_QC304_201214	0089_QC403_201214,	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW137_201214, 0089_MW141_201214, 0089_MW269_201214, 0089_QC110_201214, 0089_QC301_201214, 0089_QC302_201214,	0089_MW142_201214, 0089_MW268_201214, 0089_MW264_201214, 0089_MW256_201214, 0089_QC401_201214, 0089_QC402_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC303_201214, 0089_QC304_201214	0089_QC403_201214,	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	37	**8.11**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	37	**2.70**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013975**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17098	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 16 / 16

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2013975-001	14-Dec-2020 10:19	0089_MW137_201214	✓	✓	✓	✓	✓	✓	✓
EP2013975-002	14-Dec-2020 10:50	0089_MW142_201214	✓	✓	✓	✓	✓	✓	✓
EP2013975-003	14-Dec-2020 11:39	0089_MW141_201214	✓	✓	✓	✓	✓	✓	✓
EP2013975-004	14-Dec-2020 12:32	0089_MW268_201214	✓	✓	✓	✓	✓	✓	✓
EP2013975-005	14-Dec-2020 12:42	0089_MW269_201214	✓	✓	✓	✓	✓	✓	✓
EP2013975-006	14-Dec-2020 13:14	0089_MW264_201214	✓	✓	✓	✓	✓	✓	✓
EP2013975-007	14-Dec-2020 13:15	0089_QC110_201214	✓	✓	✓	✓	✓	✓	✓
EP2013975-008	14-Dec-2020 13:54	0089_MW256_201214	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2013975-001	14-Dec-2020 10:19	0089_MW137_201214	✓
EP2013975-002	14-Dec-2020 10:50	0089_MW142_201214	✓
EP2013975-003	14-Dec-2020 11:39	0089_MW141_201214	✓
EP2013975-004	14-Dec-2020 12:32	0089_MW268_201214	✓
EP2013975-005	14-Dec-2020 12:42	0089_MW269_201214	✓
EP2013975-006	14-Dec-2020 13:14	0089_MW264_201214	✓
EP2013975-007	14-Dec-2020 13:15	0089_QC110_201214	✓
EP2013975-008	14-Dec-2020 13:54	0089_MW256_201214	✓
EP2013975-009	14-Dec-2020 14:04	0089_QC301_201214	✓
EP2013975-010	14-Dec-2020 14:05	0089_QC401_201214	✓
EP2013975-011	14-Dec-2020 14:05	0089_QC302_201214	✓
EP2013975-012	14-Dec-2020 14:06	0089_QC402_201214	✓
EP2013975-013	14-Dec-2020 14:07	0089_QC303_201214	✓
EP2013975-014	14-Dec-2020 14:07	0089_QC403_201214	✓
EP2013975-015	14-Dec-2020 14:08	0089_QC304_201214	✓
EP2013975-016	14-Dec-2020 14:09	0089_QC404_201214	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ENMRG (ENMRG) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

COC#: 17098 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted]	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 14/12/20@16:00	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? (Yes) No N/A

Random Sample Temperature on Receipt: 10.3 °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW137		14/12/2020 10:19 AM	Water	ALS: 3 Non ALS: 1	No	Partial 7/8		X		
002	0089_MW142		14/12/2020 10:50 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
003	0089_MW141		14/12/2020 11:39 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
004	0089_MW268		14/12/2020 12:32 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
005	0089_MW269		14/12/2020 12:42 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
006	0089_MW264		14/12/2020 01:14 PM	Water	ALS: 5 Non ALS: 1	No	Partial 7/8		X		
007	0089_QC110		14/12/2020 01:15 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8		X		
008	0089_MW256		14/12/2020 01:54 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8		X		
009	0089_QC301		14/12/2020 02:04 PM	Water	ALS: 2 Non ALS: 0	No		X			

Environmental Division
Perth
Work Order Reference
EP2013975

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: **17098** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_QC401		14/12/2020 02:05 PM	Water	ALS: 2 Non ALS: 0	No		X			
011	0089_QC302		14/12/2020 02:05 PM	Water	ALS: 2 Non ALS: 0	No		X			
012	0089_QC402		14/12/2020 02:06 PM	Water	ALS: 2 Non ALS: 0	No		X			
013	0089_QC303		14/12/2020 02:07 PM	Water	ALS: 2 Non ALS: 0	No		X			
014	0089_QC403		14/12/2020 02:07 PM	Water	ALS: 2 Non ALS: 0	No		X			
015	0089_QC304		14/12/2020 02:08 PM	Water	ALS: 2 Non ALS: 0	No		X			
016	0089_QC404		14/12/2020 02:09 PM	Water	ALS: 2 Non ALS: 0	No		X			

CHAIN OF CUSTODY

COC#: **17098** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW137	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW142	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW141	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW268	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW269	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **17098** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW264	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_QC110	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW256	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **17098** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW137	HDPE (no PTFE)	20 mL	00350019170477	Grey	No	
001	0089_MW137	HDPE (no PTFE)	20 mL	00350019171043	Grey	No	
001	0089_MW137	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049196	Purple	No	
002	0089_MW142	Clear Plastic Bottle - Natural	250 mL	00070719041854	Green	No	
002	0089_MW142	HDPE (no PTFE)	20 mL	00350019170519	Grey	No	
002	0089_MW142	HDPE (no PTFE)	20 mL	00350019170955	Grey	No	
002	0089_MW142	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049303	Purple	No	
003	0089_MW141	Clear Plastic Bottle - Natural	250 mL	00070719041757	Green	No	
003	0089_MW141	HDPE (no PTFE)	20 mL	00350019170689	Grey	No	
003	0089_MW141	HDPE (no PTFE)	20 mL	00350019170589	Grey	No	
003	0089_MW141	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049013	Purple	No	
004	0089_MW268	Clear Plastic Bottle - Natural	250 mL	00070719041792	Green	No	
004	0089_MW268	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048950	Purple	No	
004	0089_MW268	HDPE (no PTFE)	20 mL	00350019170646	Grey	No	
004	0089_MW268	HDPE (no PTFE)	20 mL	00350019170478	Grey	No	
005	0089_MW269	Clear Plastic Bottle - Natural	250 mL	00070719041774	Green	No	
005	0089_MW269	HDPE (no PTFE)	20 mL	00350019170843	Grey	No	
005	0089_MW269	HDPE (no PTFE)	20 mL	00350019170562	Grey	No	
005	0089_MW269	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049298	Purple	No	
006	0089_MW264	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049285	Purple	No	
006	0089_MW264	Clear Plastic Bottle - Natural	250 mL	00070719041870	Green	No	
006	0089_MW264	HDPE (no PTFE)	20 mL	00350019171060	Grey	No	
006	0089_MW264	HDPE (no PTFE)	20 mL	00350019170735	Grey	No	
006	0089_MW264	HDPE (no PTFE)	20 mL	00350019170829	Grey	No	
007	0089_QC110	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049225	Purple	No	
007	0089_QC110	HDPE (no PTFE)	20 mL	00350019171023	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: **17098** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_QC110	HDPE (no PTFE)	20 mL	00350019170463	Grey	No	
007	0089_QC110	HDPE (no PTFE)	20 mL	00350019170653	Grey	No	
007	0089_QC110	HDPE (no PTFE)	20 mL	00350019170781	Grey	No	
007	0089_QC110	Clear Plastic Bottle - Natural	250 mL	00070719041785	Green	No	
008	0089_MW256	Clear Plastic Bottle - Natural	250 mL	00070719041830	Green	No	
008	0089_MW256	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049116	Purple	No	
008	0089_MW256	HDPE (no PTFE)	20 mL	00350019170779	Grey	No	
008	0089_MW256	HDPE (no PTFE)	20 mL	00350019170857	Grey	No	
008	0089_MW256	HDPE (no PTFE)	20 mL	00350019170809	Grey	No	
008	0089_MW256	HDPE (no PTFE)	20 mL	00350019170515	Grey	No	
009	0089_QC301	HDPE (no PTFE)	20 mL	00350019170936	Grey	No	
009	0089_QC301	HDPE (no PTFE)	20 mL	00350019170713	Grey	No	
010	0089_QC401	HDPE (no PTFE)	20 mL	00350019170757	Grey	No	
010	0089_QC401	HDPE (no PTFE)	20 mL	00350019170471	Grey	No	
011	0089_QC302	HDPE (no PTFE)	20 mL	00350019170825	Grey	No	
011	0089_QC302	HDPE (no PTFE)	20 mL	00350019170885	Grey	No	
012	0089_QC402	HDPE (no PTFE)	20 mL	00350019170912	Grey	No	
012	0089_QC402	HDPE (no PTFE)	20 mL	00350019170686	Grey	No	
013	0089_QC303	HDPE (no PTFE)	20 mL	00350019170812	Grey	No	
013	0089_QC303	HDPE (no PTFE)	20 mL	00350019170830	Grey	No	
014	0089_QC403	HDPE (no PTFE)	20 mL	00350019170919	Grey	No	
014	0089_QC403	HDPE (no PTFE)	20 mL	00350019170999	Grey	No	
015	0089_QC304	HDPE (no PTFE)	20 mL	00350019170859	Grey	No	
015	0089_QC304	HDPE (no PTFE)	20 mL	00350019170698	Grey	No	
016	0089_QC404	HDPE (no PTFE)	20 mL	00350019170783	Grey	No	
016	0089_QC404	HDPE (no PTFE)	20 mL	00350019170876	Grey	No	

Total Bottle Count: ALS: 52, Non ALS: 2

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013983**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17029	Issue Date	: 24-Dec-2020 17:22
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EA025H (Suspended Solids): Sample #3 and #4 confirmed by re-preparation and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW139_201214	0089_MW149_201214	0089_MW272_201214	0089_QC106_201214	----
			Sampling date / time	14-Dec-2020 08:42	14-Dec-2020 09:30	14-Dec-2020 10:22	14-Dec-2020 10:36	----
Compound	CAS Number	LOR	Unit	EP2013983-001	EP2013983-002	EP2013983-003	EP2013983-004	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.82	7.69	7.72	7.72	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	6580	34000	34800	36400	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	22	118	144	272	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	258	136	175	176	----
Total Alkalinity as CaCO3	----	1	mg/L	258	136	175	176	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	447	2860	2860	2960	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	3670	19100	19000	19500	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	214	497	502	535	----
Magnesium	7439-95-4	1	mg/L	283	1540	1540	1650	----
Sodium	7440-23-5	1	mg/L	1770	11700	11700	12500	----
Potassium	7440-09-7	1	mg/L	90	670	680	728	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	118	601	599	615	----
ø Total Cations	----	0.01	meq/L	113	678	678	725	----
ø Ionic Balance	----	0.01	%	2.04	5.99	6.19	8.18	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	10	4	6	8	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW139_201214	0089_MW149_201214	0089_MW272_201214	0089_QC106_201214	----
				Sampling date / time	14-Dec-2020 08:42	14-Dec-2020 09:30	14-Dec-2020 10:22	14-Dec-2020 10:36	----
Compound	CAS Number	LOR	Unit		EP2013983-001	EP2013983-002	EP2013983-003	EP2013983-004	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW139_201214	0089_MW149_201214	0089_MW272_201214	0089_QC106_201214	----
				Sampling date / time	14-Dec-2020 08:42	14-Dec-2020 09:30	14-Dec-2020 10:22	14-Dec-2020 10:36	----
Compound	CAS Number	LOR	Unit		EP2013983-001	EP2013983-002	EP2013983-003	EP2013983-004	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**113**	**108**	**107**	**113**	----
13C8-PFOA	----	0.02	%		**103**	**103**	**104**	**104**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013983**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17029	Issue Date	: 24-Dec-2020
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3433849)									
EP2013975-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.92	7.93	0.126	0% - 20%
EP2013984-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.59	7.61	0.263	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3427642)									
EP2013982-009	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	666	639	4.06	0% - 20%
EP2013982-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	646	665	2.90	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3427644)									
EP2013983-001	0089_MW139_201214	EA025H: Suspended Solids (SS)	----	5	mg/L	22	20	12.0	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3433848)									
EP2013975-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	440	407	7.67	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	440	407	7.67	0% - 20%
EP2013984-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	342	342	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	342	342	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3421720)									
EP2013964-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	41	41	0.00	0% - 20%
EP2013989-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2980	3010	1.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3421721)									
EP2013964-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	30	30	0.00	0% - 20%
EP2013989-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19900	20100	0.940	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426531)									
EP2013973-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	504	501	0.595	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3426531) - continued									
EP2013973-001	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	1570	1560	0.566	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12000	11900	1.09	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	684	681	0.410	0% - 20%
EP2013983-004	0089_QC106_201214	ED093F: Calcium	7440-70-2	1	mg/L	535	528	1.21	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1650	1630	1.16	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12500	12300	1.47	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	728	712	2.15	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3424598)									
EP2013983-001	0089_MW139_201214	EP005: Total Organic Carbon	----	1	mg/L	10	9	0.00	0% - 50%
EP2013992-003	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	15	16	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	3.86	3.76	2.74	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.66	1.69	1.48	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.27	0.25	7.13	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.12	0.12	0.00	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.15	0.14	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3429909) - continued									
EP2013984-008	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	6.16	6.05	1.80	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3433849)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3427642)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	97.4	88.1	114
				<10	1000 mg/L	103	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3427644)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	114	89.1	120
				<5	1000 mg/L	104	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3433848)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	108	81.2	126
				<1	200 mg/L	98.3	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3421720)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	106	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3421721)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	92.4	87.9	114
				<1	1000 mg/L	101	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426531)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.6	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.1	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.4	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.4	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3424598)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	116	87.2	116
				<1	100 mg/L	112	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429909)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	89.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	103	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429909) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	86.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	95.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429909)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	84.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	82.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	79.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	94.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	86.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	87.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	81.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	83.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	85.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	82.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429909)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	85.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	92.1	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	81.2	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	81.9	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	79.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	84.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	81.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3429909)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	113	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	81.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	123	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	115	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3421720)							
EP2013964-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	114	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3421721)							
EP2013964-007	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	102	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3424598)							
EP2013983-002	0089_MW149_201214	EP005: Total Organic Carbon	----	100 mg/L	111	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013983**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted]	No. of samples received	: 4
Order number	: DEF19009/730	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	----	----	----	21-Dec-2020	14-Dec-2020	**7**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	18	5.56	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	18	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	14-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	28-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**----**	----	----	**16-Dec-2020**	11-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW139_201214, 0089_MW149_201214, 0089_MW272_201214, 0089_QC106_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	18	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013983**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17029	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2013983-001	14-Dec-2020 08:42	0089_MW139_201214	✓	✓	✓	✓	✓	✓	✓
EP2013983-002	14-Dec-2020 09:30	0089_MW149_201214	✓	✓	✓	✓	✓	✓	✓
EP2013983-003	14-Dec-2020 10:22	0089_MW272_201214	✓	✓	✓	✓	✓	✓	✓
EP2013983-004	14-Dec-2020 10:36	0089_QC106_201214	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2013983-001	14-Dec-2020 08:42	0089_MW139_201214	✓
EP2013983-002	14-Dec-2020 09:30	0089_MW149_201214	✓
EP2013983-003	14-Dec-2020 10:22	0089_MW272_201214	✓
EP2013983-004	14-Dec-2020 10:36	0089_QC106_201214	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]
[redacted]		
- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

(ALS) COC#: 17029 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted]BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 14/12 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG-DEF19009/Stirling GW

ORDER NO: DEF19009/730

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW139		14/12/2020 08:42 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW149	mw149	14/12/2020 09:30 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW272		14/12/2020 10:22 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_QC106		14/12/2020 10:36 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2013983

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: **17029** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG-DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW139	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW149	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW272	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_QC106	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **17029** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG-DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW139	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049307	Purple	No	
001	0089_MW139	Clear Plastic Bottle - Natural	250 mL	00070719041853	Green	No	
001	0089_MW139	HDPE (no PTFE)	20 mL	00350019171057	Grey	No	
001	0089_MW139	HDPE (no PTFE)	20 mL	00350019171037	Grey	No	
002	0089_MW149	Clear Plastic Bottle - Natural	250 mL	00070719041749	Green	No	
002	0089_MW149	HDPE (no PTFE)	20 mL	00350019170750	Grey	No	
002	0089_MW149	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049144	Purple	No	
002	0089_MW149	HDPE (no PTFE)	20 mL	00350019170492	Grey	No	
003	0089_MW272	Clear Plastic Bottle - Natural	250 mL	00070719041761	Green	No	
003	0089_MW272	HDPE (no PTFE)	20 mL	00350019170742	Grey	No	
003	0089_MW272	HDPE (no PTFE)	20 mL	00350019170527	Grey	No	
003	0089_MW272	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049008	Purple	No	
004	0089_QC106	Clear Plastic Bottle - Natural	250 mL	00070719041702	Green	No	
004	0089_QC106	HDPE (no PTFE)	20 mL	00352005005257	Grey	No	
004	0089_QC106	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049077	Purple	No	
004	0089_QC106	HDPE (no PTFE)	20 mL	00352005005310	Grey	No	

Total Bottle Count: ALS: 16, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013984**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Dec-2020
C-O-C number	: 17078	Issue Date	: 24-Dec-2020 17:25
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EA025 (Suspended Solids): It has been identified that sample #5 and #6 are likely client duplicates. Please note that sample #5 upon visual inspection contains more sediment than sample #6.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW124_201214	0089_MW125_201214	0089_MW126_201214	0089_MW127_201214	0089_QC108_201214
			Sampling date / time	14-Dec-2020 08:40	14-Dec-2020 08:52	14-Dec-2020 09:04	14-Dec-2020 09:22	14-Dec-2020 11:08
Compound	CAS Number	LOR	Unit	EP2013984-001	EP2013984-002	EP2013984-003	EP2013984-004	EP2013984-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.60	7.59	7.51	7.61	7.91
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	28100	29700	26500	25500	408
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	269	236	156	124	1010
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	359	342	485	470	290
Total Alkalinity as CaCO3	----	1	mg/L	359	342	485	470	290
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2170	2200	1860	1850	26
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	16000	16100	15000	14800	43
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	516	536	505	467	85
Magnesium	7439-95-4	1	mg/L	1280	1380	1290	1320	16
Sodium	7440-23-5	1	mg/L	9200	9760	8710	8820	31
Potassium	7440-09-7	1	mg/L	498	531	461	470	3
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	504	507	472	465	7.55
ø Total Cations	----	0.01	meq/L	544	578	522	528	6.98
ø Ionic Balance	----	0.01	%	3.85	6.60	5.08	6.26	3.89
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	16	15	9	18	13
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.09	<0.02	<0.02	0.12
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.08	<0.02	<0.02	0.34
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.38	<0.02	<0.02	8.68
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	1.20

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW124_201214	0089_MW125_201214	0089_MW126_201214	0089_MW127_201214	0089_QC108_201214
				Sampling date / time	14-Dec-2020 08:40	14-Dec-2020 08:52	14-Dec-2020 09:04	14-Dec-2020 09:22	14-Dec-2020 11:08
Compound	CAS Number	LOR	Unit		EP2013984-001	EP2013984-002	EP2013984-003	EP2013984-004	EP2013984-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**10.1**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	**0.1**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.23**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.08**	<0.02	<0.02	**1.36**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.16**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.67**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW124_201214	0089_MW125_201214	0089_MW126_201214	0089_MW127_201214	0089_QC108_201214
				Sampling date / time	14-Dec-2020 08:40	14-Dec-2020 08:52	14-Dec-2020 09:04	14-Dec-2020 09:22	14-Dec-2020 11:08
Compound	CAS Number	LOR	Unit		EP2013984-001	EP2013984-002	EP2013984-003	EP2013984-004	EP2013984-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.63**	<0.01	<0.01	**23.0**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.38**	<0.01	<0.01	**18.8**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.55**	<0.01	<0.01	**21.4**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**110**	**109**	**113**	**114**	**103**
13C8-PFOA	----	0.02	%		**104**	**104**	**102**	**102**	**98.9**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW109_201214	0089_MW112_201214	0089_MW120_201214	0089_MW158_201214	0089_MW166_201214
				Sampling date / time	14-Dec-2020 11:09	14-Dec-2020 11:21	14-Dec-2020 11:34	14-Dec-2020 12:11	14-Dec-2020 12:42
Compound	CAS Number	LOR	Unit		EP2013984-006	EP2013984-007	EP2013984-008	EP2013984-009	EP2013984-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.95	7.92	7.97	7.80	7.86
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		412	344	348	8360	2070
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		127	250	105	52	74
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		278	241	228	440	394
Total Alkalinity as CaCO3	----	1	mg/L		278	241	228	440	394
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		26	26	22	526	176
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		44	34	37	4750	899
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		89	73	67	191	120
Magnesium	7439-95-4	1	mg/L		16	10	15	338	92
Sodium	7440-23-5	1	mg/L		32	22	29	2250	455
Potassium	7440-09-7	1	mg/L		3	2	3	110	41
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		7.34	6.32	6.06	154	36.9
ø Total Cations	----	0.01	meq/L		7.23	5.47	5.92	138	34.4
ø Ionic Balance	----	0.01	%		0.76	7.14	1.18	5.38	3.50
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		14	11	8	14	7
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.12	0.14	0.02	<0.02	0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.31	0.53	0.05	<0.02	0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		8.32	32.5	1.66	<0.02	0.47
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		1.10	3.74	0.27	<0.02	0.05

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW109_201214	0089_MW112_201214	0089_MW120_201214	0089_MW158_201214	0089_MW166_201214
				Sampling date / time	14-Dec-2020 11:09	14-Dec-2020 11:21	14-Dec-2020 11:34	14-Dec-2020 12:11	14-Dec-2020 12:42
Compound	CAS Number	LOR	Unit		EP2013984-006	EP2013984-007	EP2013984-008	EP2013984-009	EP2013984-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**10.0**	**16.6**	**3.86**	<0.01	**7.53**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.1**	**0.2**	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.22**	**0.41**	**0.03**	<0.02	**0.22**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**1.31**	**2.86**	**0.15**	<0.02	**0.20**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.15**	**0.54**	<0.02	<0.02	**0.12**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.48**	**3.84**	**0.12**	<0.01	**0.04**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	**0.17**	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW109_201214	0089_MW112_201214	0089_MW120_201214	0089_MW158_201214	0089_MW166_201214
				Sampling date / time	14-Dec-2020 11:09	14-Dec-2020 11:21	14-Dec-2020 11:34	14-Dec-2020 12:11	14-Dec-2020 12:42
					EP2013984-006	EP2013984-007	EP2013984-008	EP2013984-009	EP2013984-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	**0.14**	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**22.1**	**61.7**	**6.16**	<0.01	**8.67**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**18.3**	**49.1**	**5.52**	<0.01	**8.00**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**20.7**	**57.2**	**5.84**	<0.01	**8.60**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**106**	**82.1**	**112**	**116**	**110**
13C8-PFOA	----	0.02	%		**104**	**102**	**103**	**118**	**117**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013984**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Dec-2020
C-O-C number	: 17078	Issue Date	: 24-Dec-2020
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 3433849)									
EP2013975-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.92	7.93	0.126	0% - 20%
EP2013984-002	0089_MW125_201214	EA005-P: pH Value	----	0.01	pH Unit	7.59	7.61	0.263	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3433851)									
EP2013984-009	0089_MW158_201214	EA005-P: pH Value	----	0.01	pH Unit	7.80	7.84	0.512	0% - 20%
EP2013988-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.67	7.67	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3427659)									
EP2013984-002	0089_MW125_201214	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	29700	28300	4.82	0% - 20%
EP2013973-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37100	36000	3.03	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3427660)									
EP2013984-004	0089_MW127_201214	EA025H: Suspended Solids (SS)	----	5	mg/L	124	119	4.73	0% - 20%
EP2013973-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	99	62	45.2	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3433848)									
EP2013975-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	440	407	7.67	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	440	407	7.67	0% - 20%
EP2013984-002	0089_MW125_201214	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	342	342	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	342	342	0.00	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3433850)									
EP2013984-009	0089_MW158_201214	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	440	440	0.00	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3433850) - continued									
EP2013984-009	0089_MW158_201214	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	440	440	0.00	0% - 20%
EP2013988-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	125	125	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	125	125	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3422385)									
EP2013984-001	0089_MW124_201214	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2170	2160	0.593	0% - 20%
EP2013985-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2910	2920	0.0805	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3422386)									
EP2013984-001	0089_MW124_201214	ED045G: Chloride	16887-00-6	1	mg/L	16000	16000	0.286	0% - 20%
EP2013985-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19800	19900	0.760	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426531)									
EP2013973-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	504	501	0.595	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1570	1560	0.566	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12000	11900	1.09	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	684	681	0.410	0% - 20%
EP2013983-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	535	528	1.21	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1650	1630	1.16	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12500	12300	1.47	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	728	712	2.15	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426532)									
EP2013984-010	0089_MW166_201214	ED093F: Calcium	7440-70-2	1	mg/L	120	122	1.51	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	92	92	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	455	456	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	41	41	0.00	0% - 20%
EP2013991-012	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	17	17	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	77	77	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	8	8	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3422159)									
EP2013982-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	20	22	7.42	0% - 20%
EP2013984-001	0089_MW124_201214	EP005: Total Organic Carbon	----	1	mg/L	16	16	0.00	0% - 50%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3429909)									
EP2013984-008	0089_MW120_201214	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	3.86	3.76	2.74	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.66	1.69	1.48	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.27	0.25	7.13	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3429909)									
EP2013984-008	0089_MW120_201214	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.12	0.12	0.00	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.15	0.14	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3429909)									
EP2013984-008	0089_MW120_201214	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3429909)									
EP2013984-008	0089_MW120_201214	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3429909)									
EP2013984-008	0089_MW120_201214	EP231X: Sum of PFAS	----	0.01	µg/L	6.16	6.05	1.80	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3433849)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3433851)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98.5	102
				----	7 pH Unit	99.7	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3427659)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	104	88.1	114
				<10	1000 mg/L	108	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3427660)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	115	89.1	120
				<5	1000 mg/L	103	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3433848)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	108	81.2	126
				<1	200 mg/L	98.3	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3433850)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	100	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422385)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3422386)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	91.1	87.9	114
				<1	1000 mg/L	101	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426531)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.6	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.1	88.0	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3426531) - continued								
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.4	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.4	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3426532)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	103	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.1	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3422159)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	108	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429909)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	89.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	103	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	86.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	95.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429909)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	84.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	82.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	79.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	94.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	86.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	87.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	81.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	83.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	85.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	82.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429909)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	85.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	92.1	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	81.2	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	81.9	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	79.4	57.6	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429909) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	84.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	81.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3429909)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	113	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	81.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	123	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	115	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422385)							
EP2013984-001	0089_MW124_201214	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3422386)							
EP2013984-001	0089_MW124_201214	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3422159)							
EP2013982-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	111	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013984**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted]	No. of samples received	: 10
Order number	: DEF19009/730	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2013984--001	0089_MW124_201214	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2013984--001	0089_MW124_201214	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW124_201214,	0089_MW125_201214,	----	----	----	21-Dec-2020	14-Dec-2020	**7**
0089_MW126_201214,	0089_MW127_201214,						
0089_QC108_201214,	0089_MW109_201214,						
0089_MW112_201214,	0089_MW120_201214,						
0089_MW158_201214,	0089_MW166_201214						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	18	5.56	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	18	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	14-Dec-2020	×
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	28-Dec-2020	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**----**	----	----	**15-Dec-2020**	11-Jan-2021	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0089_MW124_201214,	0089_MW125_201214,	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
0089_MW126_201214,	0089_MW127_201214,							
0089_QC108_201214,	0089_MW109_201214,							
0089_MW112_201214,	0089_MW120_201214,							
0089_MW158_201214,	0089_MW166_201214							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	28	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	17	**5.88**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	18	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013984**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17078	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 10 / 10

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2013984-001	14-Dec-2020 08:40	0089_MW124_201214	✓	✓	✓	✓	✓	✓	✓
EP2013984-002	14-Dec-2020 08:52	0089_MW125_201214	✓	✓	✓	✓	✓	✓	✓
EP2013984-003	14-Dec-2020 09:04	0089_MW126_201214	✓	✓	✓	✓	✓	✓	✓
EP2013984-004	14-Dec-2020 09:22	0089_MW127_201214	✓	✓	✓	✓	✓	✓	✓
EP2013984-005	14-Dec-2020 11:08	0089_QC108_201214	✓	✓	✓	✓	✓	✓	✓
EP2013984-006	14-Dec-2020 11:09	0089_MW109_201214	✓	✓	✓	✓	✓	✓	✓
EP2013984-007	14-Dec-2020 11:21	0089_MW112_201214	✓	✓	✓	✓	✓	✓	✓
EP2013984-008	14-Dec-2020 11:34	0089_MW120_201214	✓	✓	✓	✓	✓	✓	✓
EP2013984-009	14-Dec-2020 12:11	0089_MW158_201214	✓	✓	✓	✓	✓	✓	✓
EP2013984-010	14-Dec-2020 12:42	0089_MW166_201214	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2013984-001	14-Dec-2020 08:40	0089_MW124_201214	✓
EP2013984-002	14-Dec-2020 08:52	0089_MW125_201214	✓
EP2013984-003	14-Dec-2020 09:04	0089_MW126_201214	✓
EP2013984-004	14-Dec-2020 09:22	0089_MW127_201214	✓
EP2013984-005	14-Dec-2020 11:08	0089_QC108_201214	✓
EP2013984-006	14-Dec-2020 11:09	0089_MW109_201214	✓
EP2013984-007	14-Dec-2020 11:21	0089_MW112_201214	✓
EP2013984-008	14-Dec-2020 11:34	0089_MW120_201214	✓
EP2013984-009	14-Dec-2020 12:11	0089_MW158_201214	✓
EP2013984-010	14-Dec-2020 12:42	0089_MW166_201214	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

ALS COC#: 17078 ALS Laboratory: EP Perth

RELINQUISHED BY:	[redacted]BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 14/12 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW124		14/12/2020 08:40 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW125		14/12/2020 08:52 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW126		14/12/2020 09:04 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_MW127		14/12/2020 09:22 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_QC108		14/12/2020 11:08 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_MW109		14/12/2020 11:09 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_MW112		14/12/2020 11:21 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_MW120		14/12/2020 11:34 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		
009	0089_MW158		14/12/2020 12:11 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division Perth

Work Order Reference

EP2013984

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: 17078 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW166		14/12/2020 12:42 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

ALS COC#: 17078 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW124	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW125	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW126	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW127	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_QC108	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 17078 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW109	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW112	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW120	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_MW158	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_MW166	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: 17078 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW124	Clear Plastic Bottle - Natural	250 mL	00070719041821	Green	No	
001	0089_MW124	HDPE (no PTFE)	20 mL	00352005006302	Grey	No	
001	0089_MW124	HDPE (no PTFE)	20 mL	00352005006561	Grey	No	
001	0089_MW124	Amber TOC Vial - Sulfuric Acid	40 mL	00180220022525	Purple	No	
002	0089_MW125	Clear Plastic Bottle - Natural	250 mL	00070719041720	Green	No	
002	0089_MW125	HDPE (no PTFE)	20 mL	00352005006394	Grey	No	
002	0089_MW125	HDPE (no PTFE)	20 mL	00352005006512	Grey	No	
002	0089_MW125	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049139	Purple	No	
003	0089_MW126	Clear Plastic Bottle - Natural	250 mL	00070719041752	Green	No	
003	0089_MW126	HDPE (no PTFE)	20 mL	00352005005125	Grey	No	
003	0089_MW126	HDPE (no PTFE)	20 mL	00352005005292	Grey	No	
003	0089_MW126	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049109	Purple	No	
004	0089_MW127	Clear Plastic Bottle - Natural	250 mL	00070719041708	Green	No	
004	0089_MW127	HDPE (no PTFE)	20 mL	00352005006385	Grey	No	
004	0089_MW127	HDPE (no PTFE)	20 mL	00352005005280	Grey	No	
004	0089_MW127	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049176	Purple	No	
005	0089_QC108	Clear Plastic Bottle - Natural	250 mL	00070719041828	Green	No	
005	0089_QC108	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049027	Purple	No	
005	0089_QC108	HDPE (no PTFE)	20 mL	00350019102578	Grey	No	
005	0089_QC108	HDPE (no PTFE)	20 mL	00350019102672	Grey	No	
006	0089_MW109	HDPE (no PTFE)	20 mL	00352005006371	Grey	No	
006	0089_MW109	HDPE (no PTFE)	20 mL	00352005006282	Grey	No	
006	0089_MW109	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049002	Purple	No	
006	0089_MW109	Clear Plastic Bottle - Natural	250 mL	00070719041756	Green	No	
007	0089_MW112	HDPE (no PTFE)	20 mL	00350019102683	Grey	No	
007	0089_MW112	HDPE (no PTFE)	20 mL	00350019102477	Grey	No	

CHAIN OF CUSTODY

COC#: **17078** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_MW112	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049048	Purple	No	
007	0089_MW112	Clear Plastic Bottle - Natural	250 mL	00070719041709	Green	No	
008	0089_MW120	Clear Plastic Bottle - Natural	250 mL	00070719041753	Green	No	
008	0089_MW120	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049090	Purple	No	
008	0089_MW120	HDPE (no PTFE)	20 mL	00350019102565	Grey	No	
008	0089_MW120	HDPE (no PTFE)	20 mL	00352005006464	Grey	No	
008	0089_MW120	HDPE (no PTFE)	20 mL	00352005005089	Grey	No	
008	0089_MW120	HDPE (no PTFE)	20 mL	00350019127040	Grey	No	
009	0089_MW158	Clear Plastic Bottle - Natural	250 mL	00070734040697	Green	No	
009	0089_MW158	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049088	Purple	No	
009	0089_MW158	HDPE (no PTFE)	20 mL	00350019126888	Grey	No	
009	0089_MW158	HDPE (no PTFE)	20 mL	00350019102651	Grey	No	
010	0089_MW166	Clear Plastic Bottle - Natural	250 mL	00070719041772	Green	No	
010	0089_MW166	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049043	Purple	No	
010	0089_MW166	HDPE (no PTFE)	20 mL	00350019126962	Grey	No	
010	0089_MW166	HDPE (no PTFE)	20 mL	00350019126909	Grey	No	

Total Bottle Count: ALS: 42, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013985**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17079	Issue Date	: 24-Dec-2020 17:29
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EA025 (Suspended Solids): It has been identified that sample #2 and #3 are likely client duplicates. Please note that sample #3 upon visual inspection contains more sediment than sample #2.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW335_201214	0089_QC105_201214	0089_PW364_201214	----	----
			Sampling date / time	14-Dec-2020 10:09	14-Dec-2020 10:09	14-Dec-2020 10:29	----	----
Compound	CAS Number	LOR	Unit	EP2013985-002	EP2013985-003	EP2013985-004	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.48	7.57	7.72	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	39600	37200	39000	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	125	418	238	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	192	192	150	----	----
Total Alkalinity as CaCO3	----	1	mg/L	192	192	150	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2840	2940	2940	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	19800	20000	19600	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	511	539	519	----	----
Magnesium	7439-95-4	1	mg/L	1580	1660	1650	----	----
Sodium	7440-23-5	1	mg/L	12200	12700	12600	----	----
Potassium	7440-09-7	1	mg/L	679	712	704	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	621	629	617	----	----
ø Total Cations	----	0.01	meq/L	704	734	728	----	----
ø Ionic Balance	----	0.01	%	6.19	7.70	8.23	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	6	6	6	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW335_201214	0089_QC105_201214	0089_PW364_201214	----	----
				Sampling date / time	14-Dec-2020 10:09	14-Dec-2020 10:09	14-Dec-2020 10:29	----	----
Compound	CAS Number	LOR	Unit		EP2013985-002	EP2013985-003	EP2013985-004	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**0.01**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW335_201214	0089_QC105_201214	0089_PW364_201214	----	----
				Sampling date / time	14-Dec-2020 10:09	14-Dec-2020 10:09	14-Dec-2020 10:29	----	----
Compound	CAS Number	LOR	Unit		EP2013985-002	EP2013985-003	EP2013985-004	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.01**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.01**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.01**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**105**	**111**	**118**	----	----
13C8-PFOA	----	0.02	%		**114**	**116**	**119**	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW130_201214	----	----	----	----
				Sampling date / time	14-Dec-2020 09:38	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2013985-001	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.97	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		38900	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		114	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		134	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		134	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2910	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19800	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		498	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1590	----	----	----	----
Sodium	7440-23-5	1	mg/L		12200	----	----	----	----
Potassium	7440-09-7	1	mg/L		677	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		622	----	----	----	----
ø Total Cations	----	0.01	meq/L		704	----	----	----	----
ø Ionic Balance	----	0.01	%		6.18	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		6	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW130_201214	----	----	----	----
			Sampling date / time		14-Dec-2020 09:38	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2013985-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.09**	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW130_201214	----	----	----	----
				Sampling date / time	14-Dec-2020 09:38	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2013985-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.09**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.09**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**105**	----	----	----	----
13C8-PFOA	----	0.02	%		**105**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013985**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17079	Issue Date	: 24-Dec-2020
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3433851)									
EP2013984-009	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.80	7.84	0.512	0% - 20%
EP2013988-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.67	7.67	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3427646)									
EP2013985-001	0089_SW130_201214	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	38900	39000	0.308	0% - 20%
EP2013975-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37200	34200	8.51	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3427647)									
EP2013985-003	0089_QC105_201214	EA025H: Suspended Solids (SS)	----	5	mg/L	418	358	15.4	0% - 20%
EP2013975-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	112	# 144	25.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3433850)									
EP2013984-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	440	440	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	440	440	0.00	0% - 20%
EP2013988-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	125	125	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	125	125	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3422385)									
EP2013984-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2170	2160	0.593	0% - 20%
EP2013985-001	0089_SW130_201214	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2910	2920	0.0805	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3422386)									
EP2013984-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	16000	16000	0.286	0% - 20%
EP2013985-001	0089_SW130_201214	ED045G: Chloride	16887-00-6	1	mg/L	19800	19900	0.760	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426587)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3426587) - continued									
EP2013975-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	597	632	5.82	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1530	1620	6.13	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11500	12400	7.05	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	672	727	7.86	0% - 20%
EP2013985-003	0089_QC105_201214	ED093F: Calcium	7440-70-2	1	mg/L	539	525	2.74	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1660	1630	1.53	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12700	12600	0.441	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	712	700	1.61	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3424598)									
EP2013983-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	10	9	0.00	0% - 50%
EP2013992-003	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	15	16	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	3.86	3.76	2.74	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.66	1.69	1.48	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.27	0.25	7.13	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.12	0.12	0.00	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.15	0.14	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3429909) - continued									
EP2013984-008	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3429909)									
EP2013984-008	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	6.16	6.05	1.80	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3433851)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98.5	102
				----	7 pH Unit	99.7	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3427646)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114
				<10	1000 mg/L	100	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3427647)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	93.0	89.1	120
				<5	1000 mg/L	92.0	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3433850)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	100	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422385)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3422386)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	91.1	87.9	114
				<1	1000 mg/L	101	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426587)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.9	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.3	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3424598)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	116	87.2	116
				<1	100 mg/L	112	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429909)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	89.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	103	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429909) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	86.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	95.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429910)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	73.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	95.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	95.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	94.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	79.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	93.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429909)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	84.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	82.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	79.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	94.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	86.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	87.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	81.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	83.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	85.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	82.6	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429910)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	73.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	75.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	74.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	80.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	75.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	77.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	71.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	95.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429909)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	85.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	92.1	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	81.2	62.6	147

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429909) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	81.9	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	79.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	84.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	81.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429910)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	70.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	76.2	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	74.2	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	88.9	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	69.8	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	68.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	68.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3429909)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	113	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	81.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	123	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	115	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3429910)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	75.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	113	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	83.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	84.2	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422385)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422385) - continued							
EP2013984-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3422386)							
EP2013984-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3424598)							
EP2013983-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	111	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013985**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted]	No. of samples received	: 4
Order number	: DEF19009/730	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EA025: Total Suspended Solids dried at 104 ± 2°C	EP2013975--001	Anonymous	**Suspended Solids (SS)**	----	25.0 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2013984--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2013984--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_SW130_201214,	0089_PW335_201214,	----	----	----	21-Dec-2020	14-Dec-2020	**7**
0089_QC105_201214,	0089_PW364_201214						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	37	2.70	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	37	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_SW130_201214, 0089_PW335_201214, 0089_QC105_201214, 0089_PW364_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	14-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_SW130_201214, 0089_PW335_201214, 0089_QC105_201214, 0089_PW364_201214	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW130_201214, 0089_PW335_201214, 0089_QC105_201214, 0089_PW364_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	21-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW130_201214, 0089_PW335_201214, 0089_QC105_201214, 0089_PW364_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	28-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW130_201214, 0089_PW335_201214, 0089_QC105_201214, 0089_PW364_201214	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW130_201214, 0089_PW335_201214, 0089_QC105_201214, 0089_PW364_201214	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW130_201214, 0089_PW335_201214, 0089_QC105_201214, 0089_PW364_201214	**14-Dec-2020**	**----**	----	----	**17-Dec-2020**	21-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW130_201214, 0089_PW335_201214, 0089_QC105_201214, 0089_PW364_201214	**14-Dec-2020**	**----**	----	----	**16-Dec-2020**	11-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW335_201214, 0089_QC105_201214, 0089_PW364_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)							
0089_SW130_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0089_PW335_201214, 0089_PW364_201214	0089_QC105_201214,	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)								
0089_SW130_201214		**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0089_PW335_201214, 0089_PW364_201214	0089_QC105_201214,	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)								
0089_SW130_201214		**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_PW335_201214, 0089_PW364_201214	0089_QC105_201214,	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)								
0089_SW130_201214		**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0089_PW335_201214, 0089_PW364_201214	0089_QC105_201214,	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)								
0089_SW130_201214		**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	37	**2.70**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	37	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013985**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17079	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2013985-001	14-Dec-2020 09:38	0089_SW130_201214	✓	✓	✓	✓	✓	✓	✓
EP2013985-002	14-Dec-2020 10:09	0089_PW335_201214	✓	✓	✓	✓	✓	✓	✓
EP2013985-003	14-Dec-2020 10:09	0089_QC105_201214	✓	✓	✓	✓	✓	✓	✓
EP2013985-004	14-Dec-2020 10:29	0089_PW364_201214	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2013985-001	14-Dec-2020 09:38	0089_SW130_201214	✓
EP2013985-002	14-Dec-2020 10:09	0089_PW335_201214	✓
EP2013985-003	14-Dec-2020 10:09	0089_QC105_201214	✓
EP2013985-004	14-Dec-2020 10:29	0089_PW364_201214	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ENMRG (ENMRG) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

COC#: 17079 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RELINQUISHED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 14/12 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW130		14/12/2020 09:38 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
~~002~~	~~0089_PW335~~		~~14/12/2020~~ 10:09 AM	~~Water~~	~~ALS: 4~~ Non ALS: 0	~~No~~	~~Partial~~ 7/8	~~X~~		
003	0089_QC105		14/12/2020 10:09 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_PW364		14/12/2020 10:29 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2013985

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 17079 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW130	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW335	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_QC105	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_PW364	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **17079** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW130	Clear Plastic Bottle - Natural	250 mL	00070719041685	Green	No	
001	0089_SW130	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049084	Purple	No	
001	0089_SW130	HDPE (no PTFE)	20 mL	00350019102677	Grey	No	
001	0089_SW130	HDPE (no PTFE)	20 mL	00350019102679	Grey	No	
002	0089_PW335	Clear Plastic Bottle - Natural	250 mL	00070719041755	Green	No	
002	0089_PW335	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049056	Purple	No	
002	0089_PW335	HDPE (no PTFE)	20 mL	00350019126995	Grey	No	
002	0089_PW335	HDPE (no PTFE)	20 mL	00350019126880	Grey	No	
003	0089_QC105	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049287	Purple	No	
003	0089_QC105	Clear Plastic Bottle - Natural	250 mL	00070719041681	Green	No	
003	0089_QC105	HDPE (no PTFE)	20 mL	00350019102427	Grey	No	
003	0089_QC105	HDPE (no PTFE)	20 mL	00350019126851	Grey	No	
004	0089_PW364	HDPE (no PTFE)	20 mL	00352005006288	Grey	No	
004	0089_PW364	HDPE (no PTFE)	20 mL	00352005005244	Grey	No	
004	0089_PW364	Clear Plastic Bottle - Natural	250 mL	00070719041712	Green	No	
004	0089_PW364	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049086	Purple	No	

Total Bottle Count: ALS: 16, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013986**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17080	Issue Date	: 24-Dec-2020 11:38
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD335_201214	0089_SD364_201214	----	----	----
			Sampling date / time	14-Dec-2020 09:57	14-Dec-2020 10:28	----	----	----
Compound	CAS Number	LOR	Unit	EP2013986-001	EP2013986-002	--------	--------	--------
				Result	Result	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**8.9**	**9.1**	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**4610**	**4330**	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**32.3**	**31.3**	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**2.1**	**3.2**	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.3**	**0.4**	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.1**	**0.2**	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**2.6**	**3.8**	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**5.4**	**4.6**	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	**0.5**	**0.5**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD335_201214	0089_SD364_201214	----	----	----
				Sampling date / time	14-Dec-2020 09:57	14-Dec-2020 10:28	----	----	----
Compound	CAS Number	LOR	Unit		EP2013986-001	EP2013986-002	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)				Sample ID	**0089_SD335_201214**	**0089_SD364_201214**	**----**	**----**	**----**
				Sampling date / time	14-Dec-2020 09:57	14-Dec-2020 10:28	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2013986-001**	**EP2013986-002**	**--------**	**--------**	**--------**
					Result	Result	----	----	----
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	**----**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	**----**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**114**	**110**	**----**	**----**	**----**
13C8-PFOA	----	0.0002	%		**100**	**106**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013986**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17080	Issue Date	: 24-Dec-2020
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3423333)									
EP2013974-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.8	9.0	1.24	0% - 20%
EP2013987-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.1	9.1	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3423332)									
EP2013974-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	4590	4420	3.77	0% - 20%
EP2013987-002	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3480	3380	2.92	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3423336)									
EP2013974-001	Anonymous	EA055: Moisture Content	----	0.1	%	33.3	34.0	1.84	0% - 20%
EP2013987-002	Anonymous	EA055: Moisture Content	----	0.1	%	22.1	24.5	10.2	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3423327)									
EP2013974-001	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	3.4	3.4	0.00	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	4.7	5.3	12.2	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.6	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	5.4	6.1	12.1	0% - 20%
EP2013987-002	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	4.0	3.6	12.3	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	3.4	3.7	6.95	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.5	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	4.1	4.4	6.22	0% - 20%
EP004: Organic Matter (QC Lot: 3423328)									
EP2013974-001	Anonymous	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit
EP2013987-003	Anonymous	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	0.0004	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP2013986-002	0089_SD364_201214	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP2013986-002	0089_SD364_201214	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3428177) - continued									
EP2013944-021	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2013986-002	0089_SD364_201214	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2013986-002	0089_SD364_201214	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3423333)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3423332)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
ED008: Exchangeable Cations (QCLot: 3423327)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	87.6	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	86.9	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	97.6	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	95.2	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	88.1	79.9	110
EP004: Organic Matter (QCLot: 3423328)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	102	70.0	120
				<0.5	85 %	94.0	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3428177)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	80.4	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	125	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.0	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	125	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	117	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3428177)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	97.2	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	95.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	99.2	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	78.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	94.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	96.0	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	96.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	94.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	86.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	102	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	108	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	99.6	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	99.6	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	92.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	93.6	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177) - continued							
EP2013944-021	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	110	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	102	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	121	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	78.5	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	94.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	99.8	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	86.8	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	77.1	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	125	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	86.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	87.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	93.2	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	99.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	105	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	110	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013986**	Page	: 1 of 4
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted]	No. of samples received	: 2
Order number	: DEF19009/730	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD335_201214, 0089_SD364_201214	**14-Dec-2020**	**16-Dec-2020**	21-Dec-2020	✓	**16-Dec-2020**	16-Dec-2020	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD335_201214, 0089_SD364_201214	**14-Dec-2020**	**16-Dec-2020**	21-Dec-2020	✓	**16-Dec-2020**	13-Jan-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD335_201214, 0089_SD364_201214	**14-Dec-2020**	**----**	----	----	**16-Dec-2020**	28-Dec-2020	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD335_201214, 0089_SD364_201214	**14-Dec-2020**	**17-Dec-2020**	11-Jan-2021	✓	**17-Dec-2020**	11-Jan-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD335_201214, 0089_SD364_201214	**14-Dec-2020**	**18-Dec-2020**	11-Jan-2021	✓	**18-Dec-2020**	11-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD335_201214, 0089_SD364_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD335_201214, 0089_SD364_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD335_201214, 0089_SD364_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD335_201214, 0089_SD364_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD335_201214, 0089_SD364_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
Sample Extraction for PFAS in solid matrices	ORG73	SOIL	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013986**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17080	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2013986-001	14-Dec-2020 09:57	0089_SD335_201214	✓	✓	✓	✓
EP2013986-002	14-Dec-2020 10:28	0089_SD364_201214	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ENMRG (ENMRG) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

COC#: 17080 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted]	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 14/12 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: maelle.bourdais@cardno.com.au, derp.labreports@esdat.com.au

EMAIL INVOICES TO: claire.armstrong@cardno.com.au

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD335		14/12/2020 09:57 AM	Soil	ALS: 2 Non ALS: 0	No	X		
002	0089_SD364		14/12/2020 10:28 AM	Soil	ALS: 2 Non ALS: 0	No	X		

Environmental Division Perth

Work Order Reference

EP2013986

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

(ALS) *COC#:* **17080** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling SED

ORDER NO: DEF19009/730

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: Maelle Bourdais CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Maelle Bourdais QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: maelle.bourdais@cardno.com.au, derp.labreports@esdat.com.au

EMAIL INVOICES TO: claire.armstrong@cardno.com.au

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD335	Soil Glass Jar - Unpreserved	150 mL	00260220067724	Orange	No	
001	0089_SD335	HDPE Soil Jar	200 mL	00620719068346	Grey	No	
002	0089_SD364	HDPE Soil Jar	200 mL	00620719062843	Grey	No	
002	0089_SD364	Soil Glass Jar - Unpreserved	150 mL	00260220067763	Orange	No	

Total Bottle Count: ALS: 4, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013987**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17083	Issue Date	: 24-Dec-2020 11:38
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD363_201214	0089_SD341_201214	0089_SD362_201214	0089_SD340_201214	----
			Sampling date / time	14-Dec-2020 08:52	14-Dec-2020 09:17	14-Dec-2020 09:37	14-Dec-2020 10:00	----
Compound	CAS Number	LOR	Unit	EP2013987-001	EP2013987-002	EP2013987-003	EP2013987-004	--------
				Result	Result	Result	Result	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.1**	**9.1**	**9.2**	**9.1**	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**4190**	**3480**	**3280**	**3480**	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**27.8**	**22.1**	**21.5**	**25.8**	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**3.7**	**3.4**	**3.6**	**11.8**	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.5**	**0.5**	**0.5**	**1.2**	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	----
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	**0.2**	**0.2**	**0.2**	----
Cation Exchange Capacity	----	0.1	meq/100g	**4.4**	**4.1**	**4.2**	**13.3**	----
Exchangeable Sodium Percent	----	0.1	%	**4.0**	**4.0**	**3.7**	**2.0**	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	**0.6**	<0.5	**1.2**	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD363_201214	0089_SD341_201214	0089_SD362_201214	0089_SD340_201214	----
			Sampling date / time	14-Dec-2020 08:52	14-Dec-2020 09:17	14-Dec-2020 09:37	14-Dec-2020 10:00	----
Compound	CAS Number	LOR	Unit	EP2013987-001	EP2013987-002	EP2013987-003	EP2013987-004	--------
				Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)			Sample ID	0089_SD363_201214	0089_SD341_201214	0089_SD362_201214	0089_SD340_201214	----
			Sampling date / time	14-Dec-2020 08:52	14-Dec-2020 09:17	14-Dec-2020 09:37	14-Dec-2020 10:00	----
Compound	*CAS Number*	*LOR*	*Unit*	**EP2013987-001**	**EP2013987-002**	**EP2013987-003**	**EP2013987-004**	--------
				Result	Result	Result	Result	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**87.5**	**102**	**92.0**	**106**	----
13C8-PFOA	----	0.0002	%	**104**	**104**	**100**	**99.0**	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013987**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17083	Issue Date	: 24-Dec-2020
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3423333)									
EP2013974-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.8	9.0	1.24	0% - 20%
EP2013987-002	0089_SD341_201214	EA002: pH Value	----	0.1	pH Unit	9.1	9.1	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3423332)									
EP2013974-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	4590	4420	3.77	0% - 20%
EP2013987-002	0089_SD341_201214	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3480	3380	2.92	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3423336)									
EP2013974-001	Anonymous	EA055: Moisture Content	----	0.1	%	33.3	34.0	1.84	0% - 20%
EP2013987-002	0089_SD341_201214	EA055: Moisture Content	----	0.1	%	22.1	24.5	10.2	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3423327)									
EP2013974-001	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	3.4	3.4	0.00	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	4.7	5.3	12.2	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.6	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	5.4	6.1	12.1	0% - 20%
EP2013987-002	0089_SD341_201214	ED008: Exchangeable Sodium Percent	----	0.1	%	4.0	3.6	12.3	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	3.4	3.7	6.95	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.5	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	4.1	4.4	6.22	0% - 20%
EP004: Organic Matter (QC Lot: 3423328)									
EP2013974-001	Anonymous	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit
EP2013987-003	0089_SD362_201214	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	0.0004	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP2013986-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP2013986-002	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3428177) - continued									
EP2013944-021	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2013986-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2013986-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3423333)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3423332)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
ED008: Exchangeable Cations (QCLot: 3423327)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	87.6	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	86.9	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	97.6	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	95.2	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	88.1	79.9	110
EP004: Organic Matter (QCLot: 3423328)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	102	70.0	120
				<0.5	85 %	94.0	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3428177)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	80.4	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	125	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.0	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	125	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	117	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3428177)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	97.2	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	95.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	99.2	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	78.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	94.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	96.0	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	96.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	94.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	86.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	102	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	108	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	99.6	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	99.6	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	92.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	93.6	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177) - continued							
EP2013944-021	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	110	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	102	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	121	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	78.5	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	94.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	99.8	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	86.8	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	77.1	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	125	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	86.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	87.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	93.2	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	99.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	105	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	110	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013987**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted] [redacted]	No. of samples received	: 4
Order number	: DEF19009/730	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD363_201214, 0089_SD341_201214, 0089_SD362_201214, 0089_SD340_201214	**14-Dec-2020**	**16-Dec-2020**	21-Dec-2020	✓	**16-Dec-2020**	16-Dec-2020	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD363_201214, 0089_SD341_201214, 0089_SD362_201214, 0089_SD340_201214	**14-Dec-2020**	**16-Dec-2020**	21-Dec-2020	✓	**16-Dec-2020**	13-Jan-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD363_201214, 0089_SD341_201214, 0089_SD362_201214, 0089_SD340_201214	**14-Dec-2020**	**----**	----	----	**16-Dec-2020**	28-Dec-2020	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD363_201214, 0089_SD341_201214, 0089_SD362_201214, 0089_SD340_201214	**14-Dec-2020**	**17-Dec-2020**	11-Jan-2021	✓	**17-Dec-2020**	11-Jan-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD363_201214, 0089_SD341_201214, 0089_SD362_201214, 0089_SD340_201214	**14-Dec-2020**	**18-Dec-2020**	11-Jan-2021	✓	**18-Dec-2020**	11-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD363_201214, 0089_SD341_201214, 0089_SD362_201214, 0089_SD340_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD363_201214, 0089_SD341_201214, 0089_SD362_201214, 0089_SD340_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD363_201214, 0089_SD341_201214, 0089_SD362_201214, 0089_SD340_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD363_201214, 0089_SD341_201214, 0089_SD362_201214, 0089_SD340_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD363_201214, 0089_SD341_201214, 0089_SD362_201214, 0089_SD340_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
Sample Extraction for PFAS in solid matrices	ORG73	SOIL	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013987**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17083	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2013987-001	14-Dec-2020 08:52	0089_SD363_201214	✓	✓	✓	✓
EP2013987-002	14-Dec-2020 09:17	0089_SD341_201214	✓	✓	✓	✓
EP2013987-003	14-Dec-2020 09:37	0089_SD362_201214	✓	✓	✓	✓
EP2013987-004	14-Dec-2020 10:00	0089_SD340_201214	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) — Email — [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — derp.labreports@esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ENMRG (ENMRG) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

CHAIN OF CUSTODY

COC#: 17083 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 14/12 1600	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD363		14/12/2020 08:52 AM	Soil	ALS: 2 Non ALS: 0	No	X		
~~002~~	~~0089_SD341~~		~~14/12/2020~~ 09:17 AM	~~Soil~~	~~ALS: 2~~ Non ALS: 0	~~No~~	~~X~~		
003	0089_SD362		14/12/2020 09:37 AM	Soil	ALS: 2 Non ALS: 0	No	X		
004	0089_SD340		14/12/2020 10:00 AM	Soil	ALS: 2 Non ALS: 0	No	X		

Environmental Division
Perth
Work Order Reference
EP2013987

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: **17083** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD363	HDPE Soil Jar	200 mL	00620719062911	Grey	No	
001	0089_SD363	Soil Glass Jar - Unpreserved	150 mL	00260220067781	Orange	No	
002	0089_SD341	Soil Glass Jar - Unpreserved	150 mL	00260220067801	Orange	No	
002	0089_SD341	HDPE Soil Jar	200 mL	00620719062894	Grey	No	
003	0089_SD362	HDPE Soil Jar	200 mL	00620719062836	Grey	No	
003	0089_SD362	Soil Glass Jar - Unpreserved	150 mL	00260220067783	Orange	No	
004	0089_SD340	HDPE Soil Jar	200 mL	00620719062872	Grey	No	
004	0089_SD340	Soil Glass Jar - Unpreserved	150 mL	00260220067852	Orange	No	

Total Bottle Count: ALS: 8, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013988**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Dec-2020
C-O-C number	: 17084	Issue Date	: 24-Dec-2020 21:24
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)			Sample ID	0089_PW363_201214	0089_PW341_201214	0089_PW362_201214	0089_SW132_201214	0089_PW340_201214
			Sampling date / time	14-Dec-2020 08:50	14-Dec-2020 09:15	14-Dec-2020 09:37	14-Dec-2020 10:11	14-Dec-2020 10:12
Compound	CAS Number	LOR	Unit	EP2013988-001	EP2013988-002	EP2013988-003	EP2013988-004	EP2013988-006
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.64	7.69	7.68	7.60	7.69
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	37800	32700	38000	38200	39500
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	105	193	273	70	135
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	141	132	124	143
Total Alkalinity as CaCO3	----	1	mg/L	131	141	132	124	143
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3030	3080	3040	3050	3080
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20100	20200	20000	20300	20400
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	517	545	499	561	526
Magnesium	7439-95-4	1	mg/L	1610	1680	1510	1740	1640
Sodium	7440-23-5	1	mg/L	12200	13000	11500	13200	12500
Potassium	7440-09-7	1	mg/L	692	750	618	757	721
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	633	637	630	639	642
ø Total Cations	----	0.01	meq/L	707	750	665	765	723
ø Ionic Balance	----	0.01	%	5.52	8.17	2.71	8.99	5.93
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	6	8	8	6	15
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0089_PW363_201214	0089_PW341_201214	0089_PW362_201214	0089_SW132_201214	0089_PW340_201214
				Sampling date / time	14-Dec-2020 08:50	14-Dec-2020 09:15	14-Dec-2020 09:37	14-Dec-2020 10:11	14-Dec-2020 10:12
Compound	CAS Number	LOR	Unit		EP2013988-001	EP2013988-002	EP2013988-003	EP2013988-004	EP2013988-006
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.01**	<0.01	<0.01	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0089_PW363_201214	0089_PW341_201214	0089_PW362_201214	0089_SW132_201214	0089_PW340_201214
				Sampling date / time	14-Dec-2020 08:50	14-Dec-2020 09:15	14-Dec-2020 09:37	14-Dec-2020 10:11	14-Dec-2020 10:12
Compound	CAS Number	LOR	Unit		EP2013988-001	EP2013988-002	EP2013988-003	EP2013988-004	EP2013988-006
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**0.25**	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.25**	**0.01**	<0.01	<0.01	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.01**	<0.01	<0.01	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.25**	**0.01**	<0.01	<0.01	**0.02**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**114**	**118**	**115**	**120**	**109**
13C8-PFOA	----	0.02	%		**116**	**116**	**118**	**113**	**120**

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)			Sample ID	0089_SW134_201214	----	----	----	----
			Sampling date / time	14-Dec-2020 10:25	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2013988-007	--------	--------	--------	--------
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**8.04**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**38600**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**31**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**133**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**133**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**3020**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**20200**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**535**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**1670**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**12800**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**726**	----	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**635**	----	----	----	----
ø Total Cations	----	0.01	meq/L	**739**	----	----	----	----
ø Ionic Balance	----	0.01	%	**7.57**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**5**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0089_SW134_201214	----	----	----	----
				Sampling date / time	14-Dec-2020 10:25	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2013988-007	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0089_SW134_201214	----	----	----	----
				Sampling date / time	14-Dec-2020 10:25	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2013988-007	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**119**	----	----	----	----
13C8-PFOA	----	0.02	%		**115**	----	----	----	----

Analytical Results

Sub-Matrix: WASTEWATER (Matrix: WATER)			Sample ID	0089_QC107_201214	----	----	----	----
			Sampling date / time	14-Dec-2020 10:13	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2013988-005	--------	--------	--------	--------
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.67**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**37600**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**61**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**125**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**125**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**3030**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**20300**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**527**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**1650**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**12600**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**712**	----	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**638**	----	----	----	----
ø Total Cations	----	0.01	meq/L	**728**	----	----	----	----
ø Ionic Balance	----	0.01	%	**6.60**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**8**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WASTEWATER (Matrix: WATER)				Sample ID	0089_QC107_201214	----	----	----	----
			Sampling date / time		14-Dec-2020 10:13	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2013988-005	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WASTEWATER (Matrix: WATER)				Sample ID	0089_QC107_201214	----	----	----	----
				Sampling date / time	14-Dec-2020 10:13	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2013988-005	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**120**	----	----	----	----
13C8-PFOA	----	0.02	%		**112**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **MARINE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **WASTEWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013988**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Dec-2020
C-O-C number	: 17084	Issue Date	: 24-Dec-2020
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3433851)									
EP2013984-009	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.80	7.84	0.512	0% - 20%
EP2013988-005	0089_QC107_201214	EA005-P: pH Value	----	0.01	pH Unit	7.67	7.67	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3427646)									
EP2013985-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	38900	39000	0.308	0% - 20%
EP2013975-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37200	34200	8.51	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3427647)									
EP2013985-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	418	358	15.4	0% - 20%
EP2013975-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	112	# 144	25.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3433850)									
EP2013984-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	440	440	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	440	440	0.00	0% - 20%
EP2013988-005	0089_QC107_201214	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	125	125	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	125	125	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3430577)									
EP2013988-001	0089_PW363_201214	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3030	3070	1.25	0% - 20%
EP2014121-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	863	869	0.692	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3430578)									
EP2013988-001	0089_PW363_201214	ED045G: Chloride	16887-00-6	1	mg/L	20100	20200	0.193	0% - 20%
EP2014121-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2100	2130	1.40	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426532)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3426532) - continued									
EP2013984-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	120	122	1.51	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	92	92	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	455	456	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	41	41	0.00	0% - 20%
EP2013991-012	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	17	17	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	77	77	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	8	8	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3422380)									
EP2013988-001	0089_PW363_201214	EP005: Total Organic Carbon	----	1	mg/L	6	6	0.00	No Limit
EP2013989-004	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3433851)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98.5	102
				----	7 pH Unit	99.7	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3427646)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114
				<10	1000 mg/L	100	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3427647)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	93.0	89.1	120
				<5	1000 mg/L	92.0	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3433850)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	100	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3430577)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	87.7	113
				<1	500 mg/L	109	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3430578)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	93.2	87.9	114
				<1	1000 mg/L	102	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426532)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	103	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.1	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3422380)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	116	87.2	116
				<1	100 mg/L	108	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429910)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	73.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	95.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	95.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	94.8	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429910) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	79.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	93.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429910)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	73.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	75.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	74.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	80.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	75.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	77.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	71.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	95.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429910)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	70.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	76.2	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	74.2	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	88.9	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	69.8	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	68.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	68.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3429910)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	75.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	113	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	83.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	84.2	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3430577)							
EP2013988-001	0089_PW363_201214	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3430578)							
EP2013988-001	0089_PW363_201214	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3422380)							
EP2013988-002	0089_PW341_201214	EP005: Total Organic Carbon	----	100 mg/L	114	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013988**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted] [redacted]	No. of samples received	: 7
Order number	: DEF19009/730	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EA025: Total Suspended Solids dried at 104 ± 2°C	EP2013975--001	Anonymous	**Suspended Solids (SS)**	----	25.0 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2013988--001	0089_PW363_201214	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2013988--001	0089_PW363_201214	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	----	----	----	21-Dec-2020	14-Dec-2020	**7**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	14-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	21-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	28-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**----**	----	----	**15-Dec-2020**	11-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW363_201214, 0089_PW341_201214, 0089_PW362_201214, 0089_SW132_201214, 0089_QC107_201214, 0089_PW340_201214, 0089_SW134_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	8	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013988**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17084	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2013988-001	14-Dec-2020 08:50	0089_PW363_201214	✓	✓	✓	✓	✓	✓	✓
EP2013988-002	14-Dec-2020 09:15	0089_PW341_201214	✓	✓	✓	✓	✓	✓	✓
EP2013988-003	14-Dec-2020 09:37	0089_PW362_201214	✓	✓	✓	✓	✓	✓	✓
EP2013988-004	14-Dec-2020 10:11	0089_SW132_201214	✓	✓	✓	✓	✓	✓	✓
EP2013988-005	14-Dec-2020 10:13	0089_QC107_201214	✓	✓	✓	✓	✓	✓	✓
EP2013988-006	14-Dec-2020 10:12	0089_PW340_201214	✓	✓	✓	✓	✓	✓	✓
EP2013988-007	14-Dec-2020 10:25	0089_SW134_201214	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2013988-001	14-Dec-2020 08:50	0089_PW363_201214	✓
EP2013988-002	14-Dec-2020 09:15	0089_PW341_201214	✓
EP2013988-003	14-Dec-2020 09:37	0089_PW362_201214	✓
EP2013988-004	14-Dec-2020 10:11	0089_SW132_201214	✓
EP2013988-005	14-Dec-2020 10:13	0089_QC107_201214	✓
EP2013988-006	14-Dec-2020 10:12	0089_PW340_201214	✓
EP2013988-007	14-Dec-2020 10:25	0089_SW134_201214	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

ALS COC#: 17084 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted]Y:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 14/12 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW363		14/12/2020 08:50 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
~~002~~	~~0089_PW341~~		~~14/12/2020 09:15 AM~~	~~Water~~	~~ALS: 4 Non ALS: 0~~	~~No~~	~~Partial 7/8~~	~~X~~		
003	0089_PW362		14/12/2020 09:37 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_SW132		14/12/2020 10:11 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_QC107		14/12/2020 10:13 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_PW340		14/12/2020 10:12 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_SW134		14/12/2020 10:25 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division Perth

Work Order Reference

EP2013988

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: 17084 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW363	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW341	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW362	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW132	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_QC107	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **17084** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW340	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_SW134	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 17084 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW363	Clear Plastic Bottle - Natural	250 mL	00070719041711	Green	No	
001	0089_PW363	HDPE (no PTFE)	20 mL	00350019170878	Grey	No	
001	0089_PW363	HDPE (no PTFE)	20 mL	00350019170895	Grey	No	
001	0089_PW363	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048984	Purple	No	
002	0089_PW341	HDPE (no PTFE)	20 mL	00350019170968	Grey	No	
002	0089_PW341	HDPE (no PTFE)	20 mL	00350019170632	Grey	No	
002	0089_PW341	Clear Plastic Bottle - Natural	250 mL	00070719041728	Green	No	
002	0089_PW341	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049191	Purple	No	
003	0089_PW362	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049172	Purple	No	
003	0089_PW362	HDPE (no PTFE)	20 mL	00350019170947	Grey	No	
003	0089_PW362	HDPE (no PTFE)	20 mL	00350019170863	Grey	No	
003	0089_PW362	Clear Plastic Bottle - Natural	250 mL	00070719041714	Green	No	
004	0089_SW132	Clear Plastic Bottle - Natural	250 mL	00070719041744	Green	No	
004	0089_SW132	HDPE (no PTFE)	20 mL	00350019170998	Grey	No	
004	0089_SW132	HDPE (no PTFE)	20 mL	00350019170871	Grey	No	
004	0089_SW132	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048917	Purple	No	
005	0089_QC107	Clear Plastic Bottle - Natural	250 mL	00070719041717	Green	No	
005	0089_QC107	HDPE (no PTFE)	20 mL	00350019170637	Grey	No	
005	0089_QC107	HDPE (no PTFE)	20 mL	00350019170764	Grey	No	
005	0089_QC107	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049140	Purple	No	
006	0089_PW340	Clear Plastic Bottle - Natural	250 mL	00070719041722	Green	No	
006	0089_PW340	HDPE (no PTFE)	20 mL	00350019171017	Grey	No	
006	0089_PW340	HDPE (no PTFE)	20 mL	00350019170662	Grey	No	
006	0089_PW340	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049124	Purple	No	
007	0089_SW134	Clear Plastic Bottle - Natural	250 mL	00070719041691	Green	No	
007	0089_SW134	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049050	Purple	No	

CHAIN OF CUSTODY

COC#: **17084** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_SW134	HDPE (no PTFE)	20 mL	00350019171028	Grey	No	
007	0089_SW134	HDPE (no PTFE)	20 mL	00350019170752	Grey	No	

Total Bottle Count: ALS: 28, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013989**	Page	: 1 of 15
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Dec-2020
C-O-C number	: 17104	Issue Date	: 24-Dec-2020 17:47
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EA025H (Suspended Solids): Poor duplicate precision for sample #1 and #11, insufficient volume to conduct re-analysis. Sample contains settleable solids, scrutinise results accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW358_201214	0089_PW330_201214	0089_PW378_201214	0089_PW375_201214	0089_QC109_201214
			Sampling date / time	14-Dec-2020 09:57	14-Dec-2020 10:57	14-Dec-2020 12:35	14-Dec-2020 13:11	14-Dec-2020 13:13
Compound	CAS Number	LOR	Unit	EP2013989-002	EP2013989-003	EP2013989-005	EP2013989-007	EP2013989-008
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.80	7.77	7.88	7.86	7.80
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	38000	40300	39700	41200	40700
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	93	72	527	426	425
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	128	128	112	120	117
Total Alkalinity as CaCO3	----	1	mg/L	128	128	112	120	117
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3100	2980	3000	3070	2980
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20900	19900	19900	20400	20300
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	548	516	509	520	478
Magnesium	7439-95-4	1	mg/L	1760	1640	1640	1660	1490
Sodium	7440-23-5	1	mg/L	13600	12700	12600	12700	11200
Potassium	7440-09-7	1	mg/L	762	715	696	707	606
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	657	626	626	642	637
ø Total Cations	----	0.01	meq/L	783	731	726	733	649
ø Ionic Balance	----	0.01	%	8.79	7.77	7.41	6.64	0.94
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	7	11	6	6	7
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW358_201214	0089_PW330_201214	0089_PW378_201214	0089_PW375_201214	0089_QC109_201214
				Sampling date / time	14-Dec-2020 09:57	14-Dec-2020 10:57	14-Dec-2020 12:35	14-Dec-2020 13:11	14-Dec-2020 13:13
Compound	CAS Number	LOR	Unit		EP2013989-002	EP2013989-003	EP2013989-005	EP2013989-007	EP2013989-008
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**0.02**	**0.02**	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW358_201214	0089_PW330_201214	0089_PW378_201214	0089_PW375_201214	0089_QC109_201214
				Sampling date / time	14-Dec-2020 09:57	14-Dec-2020 10:57	14-Dec-2020 12:35	14-Dec-2020 13:11	14-Dec-2020 13:13
Compound	CAS Number	LOR	Unit		EP2013989-002	EP2013989-003	EP2013989-005	EP2013989-007	EP2013989-008
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.02**	**0.02**	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.02**	**0.02**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.02**	**0.02**	**0.02**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**117**	**108**	**115**	**112**	**100**
13C8-PFOA	----	0.02	%		**118**	**118**	**120**	**119**	**109**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW374_201214	----	----	----	----
				Sampling date / time	14-Dec-2020 13:42	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2013989-010	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.90	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		42000	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		180	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		126	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		126	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3140	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		21500	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		546	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1740	----	----	----	----
Sodium	7440-23-5	1	mg/L		13400	----	----	----	----
Potassium	7440-09-7	1	mg/L		749	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		674	----	----	----	----
ø Total Cations	----	0.01	meq/L		772	----	----	----	----
ø Ionic Balance	----	0.01	%		6.78	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		6	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW374_201214	----	----	----	----
				Sampling date / time	14-Dec-2020 13:42	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2013989-010	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW374_201214	----	----	----	----
				Sampling date / time	14-Dec-2020 13:42	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2013989-010	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**117**	----	----	----	----
13C8-PFOA	----	0.02	%		**111**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW156_201214	0089_SW154_201214	0089_SW317_201214	0089_SW318_201214	0089_SW319_201214
				Sampling date / time	14-Dec-2020 09:42	14-Dec-2020 14:12	14-Dec-2020 12:48	14-Dec-2020 13:22	14-Dec-2020 14:02
Compound	CAS Number	LOR	Unit		EP2013989-001	EP2013989-004	EP2013989-006	EP2013989-009	EP2013989-011
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.99	8.01	8.04	8.07	7.97
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		39200	35400	37600	39400	40700
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		22	164	292	60	276
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		121	122	118	123	161
Total Alkalinity as CaCO3	----	1	mg/L		121	122	118	123	161
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3120	3050	3040	2940	2990
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19600	20200	20000	20100	20400
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		513	518	506	510	520
Magnesium	7439-95-4	1	mg/L		1630	1660	1620	1640	1660
Sodium	7440-23-5	1	mg/L		12500	12700	12600	12600	12800
Potassium	7440-09-7	1	mg/L		697	714	694	694	706
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		620	636	630	631	641
ø Total Cations	----	0.01	meq/L		721	733	724	726	737
ø Ionic Balance	----	0.01	%		7.53	7.11	6.98	7.04	7.00
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		3	2	3	3	3
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW156_201214	0089_SW154_201214	0089_SW317_201214	0089_SW318_201214	0089_SW319_201214
				Sampling date / time	14-Dec-2020 09:42	14-Dec-2020 14:12	14-Dec-2020 12:48	14-Dec-2020 13:22	14-Dec-2020 14:02
Compound	CAS Number	LOR	Unit		EP2013989-001	EP2013989-004	EP2013989-006	EP2013989-009	EP2013989-011
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SW156_201214	0089_SW154_201214	0089_SW317_201214	0089_SW318_201214	0089_SW319_201214
				Sampling date / time	14-Dec-2020 09:42	14-Dec-2020 14:12	14-Dec-2020 12:48	14-Dec-2020 13:22	14-Dec-2020 14:02
					EP2013989-001	EP2013989-004	EP2013989-006	EP2013989-009	EP2013989-011
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**113**	**115**	**116**	**112**	**116**
13C8-PFOA	----	0.02	%		**119**	**119**	**119**	**118**	**112**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_QC111_201214	0089_PW357_201214	----	----	----
				Sampling date / time	14-Dec-2020 14:04	14-Dec-2020 14:02	----	----	----
Compound	CAS Number	LOR	Unit		EP2013989-012	EP2013989-013	--------	--------	--------
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.08	7.84	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		40300	40200	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		95	166	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		118	123	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		118	123	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2950	2930	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		20300	19900	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		523	504	----	----	----
Magnesium	7439-95-4	1	mg/L		1670	1610	----	----	----
Sodium	7440-23-5	1	mg/L		12900	12300	----	----	----
Potassium	7440-09-7	1	mg/L		715	681	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		636	625	----	----	----
ø Total Cations	----	0.01	meq/L		743	710	----	----	----
ø Ionic Balance	----	0.01	%		7.72	6.39	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		3	8	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_QC111_201214	0089_PW357_201214	----	----	----
			Sampling date / time	14-Dec-2020 14:04	14-Dec-2020 14:02	----	----	----
Compound	CAS Number	LOR	Unit	EP2013989-012	EP2013989-013	--------	--------	--------
				Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_QC111_201214	0089_PW357_201214	----	----	----
				Sampling date / time	14-Dec-2020 14:04	14-Dec-2020 14:02	----	----	----
Compound	CAS Number	LOR	Unit		EP2013989-012	EP2013989-013	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**118**	**119**	----	----	----
13C8-PFOA	----	0.02	%		**111**	**112**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013989**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Dec-2020
C-O-C number	: 17104	Issue Date	: 24-Dec-2020
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3433851)									
EP2013984-009	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.80	7.84	0.512	0% - 20%
EP2013988-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.67	7.67	0.00	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3433853)									
EP2013989-009	0089_SW318_201214	EA005-P: pH Value	----	0.01	pH Unit	8.07	8.08	0.00	0% - 20%
EP2014105-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.09	8.08	0.124	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3433048)									
EP2013989-009	0089_SW318_201214	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	39400	40100	1.68	0% - 20%
EP2013989-001	0089_SW156_201214	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	39200	39800	1.44	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3433049)									
EP2013989-011	0089_SW319_201214	EA025H: Suspended Solids (SS)	----	5	mg/L	276	# 401	36.7	0% - 20%
EP2013989-001	0089_SW156_201214	EA025H: Suspended Solids (SS)	----	5	mg/L	22	# 88	121	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3433850)									
EP2013984-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	440	440	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	440	440	0.00	0% - 20%
EP2013988-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	125	125	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	125	125	0.00	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3433852)									
EP2013989-009	0089_SW318_201214	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	123	123	0.00	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3433852) - continued									
EP2013989-009	0089_SW318_201214	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	123	123	0.00	0% - 20%
EP2014105-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	544	577	5.88	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	544	577	5.88	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3421720)									
EP2013964-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	41	41	0.00	0% - 20%
EP2013989-003	0089_PW330_201214	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2980	3010	1.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3422385)									
EP2013984-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2170	2160	0.593	0% - 20%
EP2013985-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2910	2920	0.0805	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3421721)									
EP2013964-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	30	30	0.00	0% - 20%
EP2013989-003	0089_PW330_201214	ED045G: Chloride	16887-00-6	1	mg/L	19900	20100	0.940	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3422386)									
EP2013984-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	16000	16000	0.286	0% - 20%
EP2013985-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19800	19900	0.760	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426587)									
EP2013975-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	597	632	5.82	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1530	1620	6.13	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11500	12400	7.05	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	672	727	7.86	0% - 20%
EP2013985-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	539	525	2.74	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1660	1630	1.53	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12700	12600	0.441	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	712	700	1.61	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426588)									
EP2013989-009	0089_SW318_201214	ED093F: Calcium	7440-70-2	1	mg/L	510	535	4.78	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1640	1710	4.38	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12600	13100	4.43	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	694	728	4.72	0% - 20%
EP2014034-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	82	83	1.39	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	42	43	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	140	143	2.15	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3422380)									
EP2013988-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	6	6	0.00	No Limit
EP2013989-004	0089_SW154_201214	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3431446)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3431446) - continued									
EM2022468-027	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EM2022468-035	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.01	0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.07	0.07	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3431446)									
EM2022468-027	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EM2022468-035	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.09	0.09	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3431446)									
EM2022468-027	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3431446) - continued									
EM2022468-027	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EM2022468-035	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3431446)									
EM2022468-027	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EM2022468-035	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3431446)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231P: PFAS Sums (QC Lot: 3431446) - continued									
EM2022468-027	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.05	0.04	22.2	No Limit
EM2022468-035	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.23	0.23	0.00	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3433851)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98.5	102
				----	7 pH Unit	99.7	98.5	102
EA005P: pH by PC Titrator (QCLot: 3433853)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98.5	102
				----	7 pH Unit	99.8	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3433048)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3433049)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	102	89.1	120
				<5	1000 mg/L	95.0	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3433850)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	100	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3433852)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	110	81.2	126
				<1	200 mg/L	98.3	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3421720)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	106	87.7	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422385)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3421721)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	92.4	87.9	114
				<1	1000 mg/L	101	87.9	114

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 3422386)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	91.1	87.9	114
				<1	1000 mg/L	101	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426587)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.9	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.3	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3426588)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	100	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.1	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3422380)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	116	87.2	116
				<1	100 mg/L	108	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3429910)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	73.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	95.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	95.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	94.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	79.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	93.0	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3431446)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	84.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	83.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	96.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429910)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	73.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	75.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	74.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	80.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	75.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.4	69.0	133

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3429910) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	77.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	71.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	95.2	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3431446)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	84.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	90.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	91.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	88.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	87.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	94.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	89.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	89.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.8	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	90.7	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3429910)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	70.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	76.2	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	74.2	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	88.9	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	69.8	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	68.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	68.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3431446)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	89.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	104	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	91.2	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	87.5	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	87.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	90.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	86.2	61.0	135

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3429910)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	75.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	113	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	83.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	84.2	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3431446)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	87.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	89.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	89.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	96.2	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3421720)							
EP2013964-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	114	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422385)							
EP2013984-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3421721)							
EP2013964-007	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	102	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3422386)							
EP2013984-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3422380)							
EP2013988-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	114	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3431446)							
EM2022468-025	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	77.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	76.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	91.8	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	93.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	86.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	87.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3431446)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3431446) - continued							
EM2022468-025	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	97.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	85.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	90.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	84.6	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	79.4	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	89.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	92.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	87.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	87.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	89.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	90.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3431446)							
EM2022468-025	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	86.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	106	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	88.7	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	80.7	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	85.1	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	86.8	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	75.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3431446)							
EM2022468-025	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	87.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	88.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	103	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	75.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013989**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted]	No. of samples received	: 13
Order number	: DEF19009/730	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EA025: Total Suspended Solids dried at 104 ± 2°C	EP2013989--001	0089_SW156_201214	**Suspended Solids (SS)**	----	121 %	0% - 50%	**RPD exceeds LOR based limits**
EA025: Total Suspended Solids dried at 104 ± 2°C	EP2013989--011	0089_SW319_201214	**Suspended Solids (SS)**	----	36.7 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2013984--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2013984--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214, 0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	----	----	----	21-Dec-2020	14-Dec-2020	**7**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	38	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	38	2.63	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214, 0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	14-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214, 0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	21-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214, 0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	21-Dec-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214, 0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	28-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214, 0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214, 0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214, 0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**----**	----	----	**17-Dec-2020**	21-Dec-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214, 0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**----**	----	----	**15-Dec-2020**	11-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X) 0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) 0089_SW156_201214, 0089_PW358_201214, 0089_PW330_201214, 0089_SW154_201214, 0089_PW378_201214, 0089_SW317_201214, 0089_PW375_201214, 0089_QC109_201214, 0089_SW318_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**21-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X) 0089_PW374_201214, 0089_SW319_201214, 0089_QC111_201214, 0089_PW357_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	16	**12.50**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	16	**12.50**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	16	**6.25**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	38	**2.63**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013989**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17104	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2013989-001	14-Dec-2020 09:42	0089_SW156_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-002	14-Dec-2020 09:57	0089_PW358_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-003	14-Dec-2020 10:57	0089_PW330_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-004	14-Dec-2020 14:12	0089_SW154_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-005	14-Dec-2020 12:35	0089_PW378_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-006	14-Dec-2020 12:48	0089_SW317_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-007	14-Dec-2020 13:11	0089_PW375_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-008	14-Dec-2020 13:13	0089_QC109_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-009	14-Dec-2020 13:22	0089_SW318_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-010	14-Dec-2020 13:42	0089_PW374_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-011	14-Dec-2020 14:02	0089_SW319_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-012	14-Dec-2020 14:04	0089_QC111_201214	✓	✓	✓	✓	✓	✓	✓
EP2013989-013	14-Dec-2020 14:02	0089_PW357_201214	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2013989-001	14-Dec-2020 09:42	0089_SW156_201214	✓
EP2013989-002	14-Dec-2020 09:57	0089_PW358_201214	✓
EP2013989-003	14-Dec-2020 10:57	0089_PW330_201214	✓
EP2013989-004	14-Dec-2020 14:12	0089_SW154_201214	✓
EP2013989-005	14-Dec-2020 12:35	0089_PW378_201214	✓
EP2013989-006	14-Dec-2020 12:48	0089_SW317_201214	✓
EP2013989-007	14-Dec-2020 13:11	0089_PW375_201214	✓
EP2013989-008	14-Dec-2020 13:13	0089_QC109_201214	✓
EP2013989-009	14-Dec-2020 13:22	0089_SW318_201214	✓
EP2013989-010	14-Dec-2020 13:42	0089_PW374_201214	✓
EP2013989-011	14-Dec-2020 14:02	0089_SW319_201214	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2013989-012	14-Dec-2020 14:04	0089_QC111_201214	✓
EP2013989-013	14-Dec-2020 14:02	0089_PW357_201214	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ENMRG (ENMRG) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 17104 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted]	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 14/12 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW156		14/12/2020 09:42 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW358	pw358	14/12/2020 09:57 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_PW330		14/12/2020 10:57 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_SW154		14/12/2020 02:12 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_PW378		14/12/2020 12:35 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_SW317		14/12/2020 12:48 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_PW375		14/12/2020 01:11 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_QC109		14/12/2020 01:13 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_SW318		14/12/2020 01:22 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth

Work Order Reference
EP2013989

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: 17104 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_PW374		14/12/2020 01:42 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
011	0089_SW319		14/12/2020 02:02 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
012	0089_QC111		14/12/2020 02:04 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

(ALS) COC#: 17104 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW156	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW358	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW330	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW154	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_PW378	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 17104 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_SW317	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW375	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_QC109	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_SW318	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_PW374	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_SW319	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **17104** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

012	0089_QC111	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 17104 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW156	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048884	Purple	No	
001	0089_SW156	HDPE (no PTFE)	20 mL	00350019126732	Grey	No	
001	0089_SW156	Clear Plastic Bottle - Natural	250 mL	00070719041723	Green	No	
001	0089_SW156	HDPE (no PTFE)	20 mL	00350019126753	Grey	No	
002	0089_PW358	HDPE (no PTFE)	20 mL	00350019171025	Grey	No	
002	0089_PW358	HDPE (no PTFE)	20 mL	00350019170601	Grey	No	
002	0089_PW358	Amber TOC Vial - Sulfuric Acid	40 mL	00180220022745	Purple	No	
002	0089_PW358	Clear Plastic Bottle - Natural	250 mL	00070719041788	Green	No	
003	0089_PW330	Clear Plastic Bottle - Natural	250 mL	00070719041748	Green	No	
003	0089_PW330	HDPE (no PTFE)	20 mL	00350019170496	Grey	No	
003	0089_PW330	HDPE (no PTFE)	20 mL	00350019170821	Grey	No	
003	0089_PW330	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049099	Purple	No	
004	0089_SW154	Clear Plastic Bottle - Natural	250 mL	00070719041739	Green	No	
004	0089_SW154	HDPE (no PTFE)	20 mL	00350019170996	Grey	No	
004	0089_SW154	HDPE (no PTFE)	20 mL	00350019170485	Grey	No	
004	0089_SW154	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049119	Purple	No	
005	0089_PW378	Clear Plastic Bottle - Natural	250 mL	00070719041746	Green	No	
005	0089_PW378	HDPE (no PTFE)	20 mL	00350019170475	Grey	No	
005	0089_PW378	HDPE (no PTFE)	20 mL	00350019170532	Grey	No	
005	0089_PW378	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049089	Purple	No	
006	0089_SW317	Clear Plastic Bottle - Natural	250 mL	00070719041705	Green	No	
006	0089_SW317	HDPE (no PTFE)	20 mL	00350019170544	Grey	No	
006	0089_SW317	HDPE (no PTFE)	20 mL	00350019170595	Grey	No	
006	0089_SW317	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049059	Purple	No	
007	0089_PW375	Clear Plastic Bottle - Natural	250 mL	00070719041760	Green	No	
007	0089_PW375	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049320	Purple	No	

CHAIN OF CUSTODY

COC#: **17104** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_PW375	HDPE (no PTFE)	20 mL	00350019170990	Grey	No	
007	0089_PW375	HDPE (no PTFE)	20 mL	00350019170712	Grey	No	
008	0089_QC109	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048987	Purple	No	
008	0089_QC109	Clear Plastic Bottle - Natural	250 mL	00070719041704	Green	No	
008	0089_QC109	HDPE (no PTFE)	20 mL	00350019170868	Grey	No	
008	0089_QC109	HDPE (no PTFE)	20 mL	00350019170634	Grey	No	
009	0089_SW318	Clear Plastic Bottle - Natural	250 mL	00070719041742	Green	No	
009	0089_SW318	HDPE (no PTFE)	20 mL	00350019170573	Grey	No	
009	0089_SW318	HDPE (no PTFE)	20 mL	00350019170604	Grey	No	
009	0089_SW318	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049110	Purple	No	
010	0089_PW374	HDPE (no PTFE)	20 mL	00350019170836	Grey	No	
010	0089_PW374	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049092	Purple	No	
010	0089_PW374	HDPE (no PTFE)	20 mL	00350019170494	Grey	No	
010	0089_PW374	Clear Plastic Bottle - Natural	250 mL	00070719041736	Green	No	
011	0089_SW319	HDPE (no PTFE)	20 mL	00350019170714	Grey	No	
011	0089_SW319	HDPE (no PTFE)	20 mL	00350019170520	Grey	No	
011	0089_SW319	Clear Plastic Bottle - Natural	250 mL	00070719041767	Green	No	
011	0089_SW319	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048992	Purple	No	
012	0089_QC111	HDPE (no PTFE)	20 mL	00350019170555	Grey	No	
012	0089_QC111	HDPE (no PTFE)	20 mL	00350019170909	Grey	No	
012	0089_QC111	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049096	Purple	No	
012	0089_QC111	Clear Plastic Bottle - Natural	250 mL	00070719041759	Green	No	

Total Bottle Count: ALS: 48, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013990**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 6746	Issue Date	: 24-Dec-2020 11:39
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD358_0.30_201214	0089_SD330_201214	0089_SD378_201214	0089_SD375_0.30_201214	0089_SD374_201214
				Sampling date / time	14-Dec-2020 09:59	14-Dec-2020 11:00	14-Dec-2020 12:38	14-Dec-2020 13:14	14-Dec-2020 13:44
					EP2013990-001	EP2013990-002	EP2013990-003	EP2013990-004	EP2013990-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**9.1**	**9.1**	**9.2**	**9.3**	**9.2**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**4020**	**4120**	**3580**	**3090**	**3070**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**26.5**	**27.3**	**22.1**	**19.8**	**18.6**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**3.1**	**3.4**	**3.1**	**2.6**	**2.0**
Exchangeable Magnesium	----	0.1	meq/100g		**0.4**	**0.4**	**0.4**	**0.4**	**0.3**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		**0.2**	**0.2**	**0.2**	**0.2**	**0.1**
Cation Exchange Capacity	----	0.1	meq/100g		**3.8**	**4.0**	**3.7**	**3.1**	**2.4**
Exchangeable Sodium Percent	----	0.1	%		**5.2**	**4.4**	**4.3**	**4.9**	**6.1**
EP004: Organic Matter									
Organic Matter	----	0.5	%		<0.5	**0.6**	**0.5**	**0.6**	**0.8**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD358_0.30_201214	0089_SD330_201214	0089_SD378_201214	0089_SD375_0.30_201214	0089_SD374_201214
				Sampling date / time	14-Dec-2020 09:59	14-Dec-2020 11:00	14-Dec-2020 12:38	14-Dec-2020 13:14	14-Dec-2020 13:44
					EP2013990-001	EP2013990-002	EP2013990-003	EP2013990-004	EP2013990-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD358_0.30_201214	0089_SD330_201214	0089_SD378_201214	0089_SD375_0.30_201214	0089_SD374_201214
				Sampling date / time	14-Dec-2020 09:59	14-Dec-2020 11:00	14-Dec-2020 12:38	14-Dec-2020 13:14	14-Dec-2020 13:44
					EP2013990-001	EP2013990-002	EP2013990-003	EP2013990-004	EP2013990-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**96.0**	**103**	**109**	**114**	**102**
13C8-PFOA	----	0.0002	%		**102**	**109**	**103**	**102**	**112**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013990**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 6746	Issue Date	: 24-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3423333)									
EP2013974-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.8	9.0	1.24	0% - 20%
EP2013987-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.1	9.1	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3423332)									
EP2013974-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	4590	4420	3.77	0% - 20%
EP2013987-002	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3480	3380	2.92	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3423336)									
EP2013974-001	Anonymous	EA055: Moisture Content	----	0.1	%	33.3	34.0	1.84	0% - 20%
EP2013987-002	Anonymous	EA055: Moisture Content	----	0.1	%	22.1	24.5	10.2	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3423327)									
EP2013974-001	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	3.4	3.4	0.00	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	4.7	5.3	12.2	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.6	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	5.4	6.1	12.1	0% - 20%
EP2013987-002	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	4.0	3.6	12.3	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	3.4	3.7	6.95	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.5	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	4.1	4.4	6.22	0% - 20%
EP004: Organic Matter (QC Lot: 3423328)									
EP2013974-001	Anonymous	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit
EP2013987-003	Anonymous	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	0.0004	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP2013986-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP2013986-002	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3428177) - continued									
EP2013944-021	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2013986-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3428177)									
EP2013944-021	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2013986-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3423333)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3423332)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
ED008: Exchangeable Cations (QCLot: 3423327)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	87.6	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	86.9	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	97.6	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	95.2	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	88.1	79.9	110
EP004: Organic Matter (QCLot: 3423328)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	102	70.0	120
				<0.5	85 %	94.0	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3428177)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	80.4	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	125	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.0	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	125	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	117	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3428177)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	97.2	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	95.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	99.2	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	78.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	94.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	96.0	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	96.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	94.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	86.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	102	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	108	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	99.6	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	99.6	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	92.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	93.6	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3428177) - continued							
EP2013944-021	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	110	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	102	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	121	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	78.5	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	94.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	99.8	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	86.8	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	77.1	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	125	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	86.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	87.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3428177)							
EP2013944-021	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	93.2	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	99.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	105	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	110	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013990**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 5
Order number	: DEF19009/730	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD358_0.30_201214, 0089_SD330_201214, 0089_SD378_201214, 0089_SD375_0.30_201214, 0089_SD374_201214	**14-Dec-2020**	**16-Dec-2020**	21-Dec-2020	✓	**16-Dec-2020**	16-Dec-2020	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD358_0.30_201214, 0089_SD330_201214, 0089_SD378_201214, 0089_SD375_0.30_201214, 0089_SD374_201214	**14-Dec-2020**	**16-Dec-2020**	21-Dec-2020	✓	**16-Dec-2020**	13-Jan-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD358_0.30_201214, 0089_SD330_201214, 0089_SD378_201214, 0089_SD375_0.30_201214, 0089_SD374_201214	**14-Dec-2020**	**----**	----	----	**16-Dec-2020**	28-Dec-2020	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD358_0.30_201214, 0089_SD330_201214, 0089_SD378_201214, 0089_SD375_0.30_201214, 0089_SD374_201214	**14-Dec-2020**	**17-Dec-2020**	11-Jan-2021	✓	**17-Dec-2020**	11-Jan-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD358_0.30_201214, 0089_SD330_201214, 0089_SD378_201214, 0089_SD375_0.30_201214, 0089_SD374_201214	**14-Dec-2020**	**18-Dec-2020**	11-Jan-2021	✓	**18-Dec-2020**	11-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD358_0.30_201214, 0089_SD330_201214, 0089_SD378_201214, 0089_SD375_0.30_201214, 0089_SD374_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD358_0.30_201214, 0089_SD330_201214, 0089_SD378_201214, 0089_SD375_0.30_201214, 0089_SD374_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD358_0.30_201214, 0089_SD330_201214, 0089_SD378_201214, 0089_SD375_0.30_201214, 0089_SD374_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD358_0.30_201214, 0089_SD330_201214, 0089_SD378_201214, 0089_SD375_0.30_201214, 0089_SD374_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD358_0.30_201214, 0089_SD330_201214, 0089_SD378_201214, 0089_SD375_0.30_201214, 0089_SD374_201214	**14-Dec-2020**	**18-Dec-2020**	12-Jun-2021	✓	**18-Dec-2020**	27-Jan-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
Sample Extraction for PFAS in solid matrices	ORG73	SOIL	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013990**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 6746	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2013990-001 : 14-Dec-2020 09:59 : 0089_SD358_0.30_201214
EP2013990-004 : 14-Dec-2020 13:14 : 0089_SD375_0.30_201214

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2013990-001	14-Dec-2020 09:59	0089_SD358_0.30_2012...	✓	✓	✓	✓
EP2013990-002	14-Dec-2020 11:00	0089_SD330_201214	✓	✓	✓	✓
EP2013990-003	14-Dec-2020 12:38	0089_SD378_201214	✓	✓	✓	✓
EP2013990-004	14-Dec-2020 13:14	0089_SD375_0.30_2012...	✓	✓	✓	✓
EP2013990-005	14-Dec-2020 13:44	0089_SD374_201214	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ENMRG (ENMRG) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

COC#: 6746 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted]BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	14/12 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD358_0.30		14/12/2020 09:59 AM	Soil	ALS: 2 Non ALS: 0	No	X		
002	0089_SD330		14/12/2020 11:00 AM	Soil	ALS: 2 Non ALS: 0	No	X		
003	0089_SD378		14/12/2020 12:38 PM	Soil	ALS: 2 Non ALS: 0	No	X		
004	0089_SD375_0.30		14/12/2020 01:14 PM	Soil	ALS: 2 Non ALS: 0	No	X		
005	0089_SD374		14/12/2020 01:44 PM	Soil	ALS: 2 Non ALS: 0	No	X		

Environmental Division
Perth
Work Order Reference
EP2013990

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 6746 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD358_0.30	HDPE Soil Jar	200 mL	00620719068432	Grey	No	
001	0089_SD358_0.30	Soil Glass Jar - Unpreserved	150 mL	00260220067799	Orange	No	
002	0089_SD330	HDPE Soil Jar	200 mL	00620719068368	Grey	No	
002	0089_SD330	Soil Glass Jar - Unpreserved	150 mL	00260220067793	Orange	No	
003	0089_SD378	Soil Glass Jar - Unpreserved	150 mL	00260220067747	Orange	No	
003	0089_SD378	HDPE Soil Jar	200 mL	00620719068302	Grey	No	
004	0089_SD375_0.30	HDPE Soil Jar	200 mL	00620719068365	Grey	No	
004	0089_SD375_0.30	Soil Glass Jar - Unpreserved	150 mL	00260220067611	Orange	No	
005	0089_SD374	HDPE Soil Jar	200 mL	00620719068396	Grey	No	
005	0089_SD374	Soil Glass Jar - Unpreserved	150 mL	00260220067613	Orange	No	

Total Bottle Count: ALS: 10, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2013992**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17081	Issue Date	: 24-Dec-2020 17:32
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW123_201214	0089_MW121_201214	0089_MW117_201214	0089_MW161_201214	0089_MW171_201214
			Sampling date / time	14-Dec-2020 11:05	14-Dec-2020 11:10	14-Dec-2020 11:11	14-Dec-2020 11:44	14-Dec-2020 12:25
Compound	CAS Number	LOR	Unit	EP2013992-001	EP2013992-002	EP2013992-003	EP2013992-004	EP2013992-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.02	8.19	7.89	8.00	7.87
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	757	325	525	1840	3510
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	643	62	222	773	21
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	231	235	408	327	326
Total Alkalinity as CaCO3	----	1	mg/L	231	235	408	327	326
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	44	21	31	217	180
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	354	44	34	774	1670
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	97	95	160	119	113
Magnesium	7439-95-4	1	mg/L	32	16	19	76	138
Sodium	7440-23-5	1	mg/L	163	26	25	403	893
Potassium	7440-09-7	1	mg/L	12	4	3	36	48
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	15.5	6.37	9.76	32.9	57.4
ø Total Cations	----	0.01	meq/L	14.9	7.29	10.7	30.6	57.1
ø Ionic Balance	----	0.01	%	2.13	6.71	4.67	3.53	0.26
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	14	8	15	6	27
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.08	0.04	0.39	0.03	0.04
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.07	0.73	0.04	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.17	3.25	10.2	1.15	0.06
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.13	1.46	0.14	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW123_201214	0089_MW121_201214	0089_MW117_201214	0089_MW161_201214	0089_MW171_201214
				Sampling date / time	14-Dec-2020 11:05	14-Dec-2020 11:10	14-Dec-2020 11:11	14-Dec-2020 11:44	14-Dec-2020 12:25
Compound	CAS Number	LOR	Unit		EP2013992-001	EP2013992-002	EP2013992-003	EP2013992-004	EP2013992-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.04**	**4.87**	**31.8**	**7.06**	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	**0.3**	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.08**	**0.08**	**0.49**	**0.17**	**0.04**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.30**	**0.30**	**2.58**	**0.17**	**0.04**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.05**	**0.25**	**0.08**	**0.03**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.15**	**0.70**	**0.11**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	**0.02**	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW123_201214	0089_MW121_201214	0089_MW117_201214	0089_MW161_201214	0089_MW171_201214
				Sampling date / time	14-Dec-2020 11:05	14-Dec-2020 11:10	14-Dec-2020 11:11	14-Dec-2020 11:44	14-Dec-2020 12:25
Compound	CAS Number	LOR	Unit		EP2013992-001	EP2013992-002	EP2013992-003	EP2013992-004	EP2013992-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	**0.05**	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.72**	**8.94**	**49.0**	**8.97**	**0.23**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.21**	**8.12**	**42.0**	**8.21**	**0.08**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.67**	**8.74**	**46.8**	**8.77**	**0.23**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**118**	**106**	**83.7**	**108**	**115**
13C8-PFOA	----	0.02	%		**110**	**107**	**106**	**109**	**106**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2013992**	Page	: 1 of 10
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17081	Issue Date	: 24-Dec-2020
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3426810)									
EP2013979-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.76	6.77	0.148	0% - 20%
EP2014074-004	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.43	6.30	2.04	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3427662)									
EP2014014-008	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	858	828	3.62	0% - 20%
EP2013992-001	0089_MW123_201214	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	757	780	2.93	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3427663)									
EP2014014-006	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	168	191	12.6	0% - 20%
EP2013992-001	0089_MW123_201214	EA025H: Suspended Solids (SS)	----	5	mg/L	643	729	12.5	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3426808)									
EP2013914-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1 mg CaCO3/L	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
EP2013979-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	27	26	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	27	26	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3422385)									
EP2013984-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2170	2160	0.593	0% - 20%
EP2013985-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2910	2920	0.0805	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3422386)									
EP2013984-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	16000	16000	0.286	0% - 20%
EP2013985-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19800	19900	0.760	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426588)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3426588) - continued									
EP2013989-009	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	510	535	4.78	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1640	1710	4.38	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12600	13100	4.43	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	694	728	4.72	0% - 20%
EP2014034-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	82	83	1.39	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	42	43	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	140	143	2.15	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3424598)									
EP2013983-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	10	9	0.00	0% - 50%
EP2013992-003	0089_MW117_201214	EP005: Total Organic Carbon	----	1	mg/L	15	16	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3431446)									
EM2022468-027	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EM2022468-035	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.01	0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.07	0.07	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3431446)									
EM2022468-027	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EM2022468-035	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.09	0.09	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3431446) - continued									
EM2022468-035	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3431446)									
EM2022468-027	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EM2022468-035	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3431446)									
EM2022468-027	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3431446) - continued									
EM2022468-027	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EM2022468-035	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3431446)									
EM2022468-027	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.05	0.04	22.2	No Limit
EM2022468-035	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.23	0.23	0.00	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3426810)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3427662)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	96.5	88.1	114
				<10	1000 mg/L	100	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3427663)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	105	89.1	120
				<5	1000 mg/L	99.2	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3426808)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	105	81.2	126
				<1	200 mg/L	95.4	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422385)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3422386)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	91.1	87.9	114
				<1	1000 mg/L	101	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426588)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	100	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.1	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3424598)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	116	87.2	116
				<1	100 mg/L	112	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3431446)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	84.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3431446) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	83.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	96.8	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3432632)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	80.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	94.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	94.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	95.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	85.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3431446)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	84.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	90.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	91.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	88.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	87.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	94.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	89.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	89.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.8	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	90.7	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3432632)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	87.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	82.8	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	82.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	81.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	83.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	88.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	86.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	84.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3431446)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	89.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	104	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	91.2	62.6	147

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3431446) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	87.5	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	87.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	90.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	86.2	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3432632)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	80.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	80.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	74.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	81.9	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	89.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	83.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	82.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3431446)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	87.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	89.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	89.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	96.2	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3432632)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	95.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	87.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	113	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	103	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422385)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3422385) - continued							
EP2013984-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3422386)							
EP2013984-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3424598)							
EP2013983-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	111	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3431446)							
EM2022468-025	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	77.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	76.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	91.8	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	93.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	86.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	87.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3431446)							
EM2022468-025	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	97.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	85.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	90.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	84.6	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	79.4	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	89.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	92.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	87.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	87.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	89.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	90.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3431446)							
EM2022468-025	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	86.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	106	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	88.7	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	80.7	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	85.1	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	86.8	65.0	136

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3431446) - continued							
EM2022468-025	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	75.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3431446)							
EM2022468-025	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	87.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	88.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	103	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	75.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2013992**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 14-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted] [redacted]	No. of samples received	: 5
Order number	: DEF19009/730	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2013984--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2013984--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW123_201214, 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	----	----	----	17-Dec-2020	14-Dec-2020	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	36	5.56	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	36	2.78	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW123_201214, 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**----**	----	----	**17-Dec-2020**	14-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW123_201214, 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**----**	----	----	**18-Dec-2020**	21-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW123_201214, 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**----**	----	----	**21-Dec-2020**	21-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW123_201214, 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**----**	----	----	**17-Dec-2020**	28-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW123_201214, 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW123_201214, 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**----**	----	----	**22-Dec-2020**	11-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW123_201214, 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**----**	----	----	**17-Dec-2020**	21-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW123_201214, 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**----**	----	----	**16-Dec-2020**	11-Jan-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0089_MW123_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X) 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) 0089_MW123_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X) 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) 0089_MW123_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X) 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0089_MW123_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X) 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) 0089_MW123_201214	**14-Dec-2020**	**21-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓
HDPE (no PTFE) (EP231X) 0089_MW121_201214, 0089_MW117_201214, 0089_MW161_201214, 0089_MW171_201214	**14-Dec-2020**	**22-Dec-2020**	12-Jun-2021	✓	**22-Dec-2020**	12-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	36	**5.56**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	15	**13.33**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	15	**13.33**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	15	**6.67**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	36	**2.78**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2013992**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17081	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 14-Dec-2020 16:00	Issue Date	: 15-Dec-2020
Client Requested Due Date	: 24-Dec-2020	Scheduled Reporting Date	: **24-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 5	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2013992-001	14-Dec-2020 11:05	0089_MW123_201214	✓	✓	✓	✓	✓	✓	✓
EP2013992-002	14-Dec-2020 11:10	0089_MW121_201214	✓	✓	✓	✓	✓	✓	✓
EP2013992-003	14-Dec-2020 11:11	0089_MW117_201214	✓	✓	✓	✓	✓	✓	✓
EP2013992-004	14-Dec-2020 11:44	0089_MW161_201214	✓	✓	✓	✓	✓	✓	✓
EP2013992-005	14-Dec-2020 12:25	0089_MW171_201214	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2013992-001	14-Dec-2020 11:05	0089_MW123_201214	✓
EP2013992-002	14-Dec-2020 11:10	0089_MW121_201214	✓
EP2013992-003	14-Dec-2020 11:11	0089_MW117_201214	✓
EP2013992-004	14-Dec-2020 11:44	0089_MW161_201214	✓
EP2013992-005	14-Dec-2020 12:25	0089_MW171_201214	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

COC#: 17081 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted] BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 14/12 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW123		14/12/2020 11:05 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW121		14/12/2020 11:10 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW117		14/12/2020 11:11 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_MW161		14/12/2020 11:44 AM	Water	ALS: 0 Non ALS: 0	No	Partial 7/8	X		
005	0089_MW171		14/12/2020 12:25 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2013992

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: **17081** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW123	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW121	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW117	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW128	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW171	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **17081** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW123	Clear Plastic Bottle - Natural	250 mL	00070719041773	Green	No	
001	0089_MW123	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049127	Purple	No	
001	0089_MW123	HDPE (no PTFE)	20 mL	00350019170635	Grey	No	
001	0089_MW123	HDPE (no PTFE)	20 mL	00350019170739	Grey	No	
002	0089_MW121	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049167	Purple	No	
002	0089_MW121	Clear Plastic Bottle - Natural	250 mL	00070719041678	Green	No	
002	0089_MW121	HDPE (no PTFE)	20 mL	00350019170800	Grey	No	
002	0089_MW121	HDPE (no PTFE)	20 mL	00350019170700	Grey	No	
003	0089_MW117	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049074	Purple	No	
003	0089_MW117	Clear Plastic Bottle - Natural	250 mL	00070719041758	Green	No	
003	0089_MW117	HDPE (no PTFE)	20 mL	00350019170828	Grey	No	
003	0089_MW117	HDPE (no PTFE)	20 mL	00350019170773	Grey	No	
005	0089_MW171	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049078	Purple	No	
005	0089_MW171	Clear Plastic Bottle - Natural	250 mL	00070719041769	Green	No	
005	0089_MW171	HDPE (no PTFE)	20 mL	00350019170679	Grey	No	
005	0089_MW171	HDPE (no PTFE)	20 mL	00350019170774	Grey	No	

Total Bottle Count: ALS: 16, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014041**	Page	: 1 of 15
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020 16:40
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17131	Issue Date	: 30-Dec-2020 16:25
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 17		
No. of samples analysed	: 17		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW233_201215	0089_MW517_201215	0089_MW224_201215	0089_MW217_201215	0089_MW282_201215
				Sampling date / time	15-Dec-2020 08:20	15-Dec-2020 08:38	15-Dec-2020 09:22	15-Dec-2020 09:24	15-Dec-2020 09:49
					EP2014041-001	EP2014041-002	EP2014041-003	EP2014041-004	EP2014041-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**8.15**	**8.12**	**8.14**	**8.01**	**7.73**
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**196**	**299**	**482**	**274**	**790**
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**30**	**284**	**247**	**175**	**1600**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**152**	**192**	**237**	**204**	**526**
Total Alkalinity as CaCO3	----	1	mg/L		**152**	**192**	**237**	**204**	**526**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**6**	**4**	**34**	**8**	**19**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**19**	**56**	**109**	**37**	**57**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**53**	**57**	**64**	**74**	**187**
Magnesium	7439-95-4	1	mg/L		**7**	**8**	**20**	**6**	**26**
Sodium	7440-23-5	1	mg/L		**20**	**40**	**83**	**25**	**52**
Potassium	7440-09-7	1	mg/L		**3**	**2**	**4**	**2**	**1**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**3.70**	**5.50**	**8.52**	**5.29**	**12.5**
ø Total Cations	----	0.01	meq/L		**4.17**	**5.29**	**8.55**	**5.32**	**13.8**
ø Ionic Balance	----	0.01	%		**5.97**	**1.90**	**0.20**	**0.36**	**4.74**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**8**	**8**	**7**	**5**	**9**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**3.29**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**7.16**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**0.14**	<0.02	<0.02	<0.02	**41.2**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**4.76**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW233_201215	0089_MW517_201215	0089_MW224_201215	0089_MW217_201215	0089_MW282_201215
				Sampling date / time	15-Dec-2020 08:20	15-Dec-2020 08:38	15-Dec-2020 09:22	15-Dec-2020 09:24	15-Dec-2020 09:49
Compound	CAS Number	LOR	Unit		EP2014041-001	EP2014041-002	EP2014041-003	EP2014041-004	EP2014041-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.11**	**0.04**	<0.01	**0.03**	**44.1**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	**0.3**	**1.1**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	**2.12**	**1.94**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	**2.44**	**11.7**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	**0.51**	**2.08**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.23**	**5.77**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	**0.02**	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW233_201215	0089_MW517_201215	0089_MW224_201215	0089_MW217_201215	0089_MW282_201215
				Sampling date / time	15-Dec-2020 08:20	15-Dec-2020 08:38	15-Dec-2020 09:22	15-Dec-2020 09:24	15-Dec-2020 09:49
					EP2014041-001	EP2014041-002	EP2014041-003	EP2014041-004	EP2014041-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	**21.7**	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	**0.57**	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.25**	**0.04**	<0.01	**27.9**	**123**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.25**	**0.04**	<0.01	**0.03**	**85.3**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.25**	**0.04**	<0.01	**27.9**	**111**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**106**	**97.1**	**100**	**102**	**63.8**
13C8-PFOA	----	0.02	%		**101**	**100**	**103**	**99.6**	**92.6**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW216_201215	0089_QC113_201215	0089_MW236_201215	0089_MW243_201215	0089_MW240_201215
			Sampling date / time	15-Dec-2020 10:11	15-Dec-2020 10:12	15-Dec-2020 10:48	15-Dec-2020 11:48	15-Dec-2020 12:01
Compound	CAS Number	LOR	Unit	EP2014041-006	EP2014041-007	EP2014041-008	EP2014041-009	EP2014041-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.86	7.83	8.03	8.05	7.97
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	1060	1140	352	536	535
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	2060	5060	184	41	46
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	354	385	244	253	251
Total Alkalinity as CaCO3	----	1	mg/L	354	385	244	253	251
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	71	71	16	51	56
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	309	310	37	55	43
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	148	150	93	117	120
Magnesium	7439-95-4	1	mg/L	41	42	15	16	14
Sodium	7440-23-5	1	mg/L	136	138	18	35	26
Potassium	7440-09-7	1	mg/L	7	8	2	4	3
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	17.3	17.9	6.25	7.67	7.39
ø Total Cations	----	0.01	meq/L	16.8	17.1	6.71	8.78	8.35
ø Ionic Balance	----	0.01	%	1.21	2.18	3.53	6.76	6.06
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	11	11	6	8	8
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.36	0.34	0.30	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.62	0.60	0.63	<0.02	0.09
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	4.22	3.93	14.9	<0.02	1.34
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.11	0.11	0.37	<0.02	0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW216_201215	0089_QC113_201215	0089_MW236_201215	0089_MW243_201215	0089_MW240_201215
				Sampling date / time	15-Dec-2020 10:11	15-Dec-2020 10:12	15-Dec-2020 10:48	15-Dec-2020 11:48	15-Dec-2020 12:01
Compound	CAS Number	LOR	Unit		EP2014041-006	EP2014041-007	EP2014041-008	EP2014041-009	EP2014041-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.63**	**0.62**	**42.6**	**0.03**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.8**	**0.7**	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**4.78**	**4.26**	**0.16**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**2.88**	**2.67**	**0.93**	<0.02	**0.11**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.37**	**0.34**	**0.38**	<0.02	**0.03**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.26**	**0.25**	**1.06**	<0.01	**0.05**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	**2.08**	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW216_201215	0089_QC113_201215	0089_MW236_201215	0089_MW243_201215	0089_MW240_201215
				Sampling date / time	15-Dec-2020 10:11	15-Dec-2020 10:12	15-Dec-2020 10:48	15-Dec-2020 11:48	15-Dec-2020 12:01
Compound	CAS Number	LOR	Unit		EP2014041-006	EP2014041-007	EP2014041-008	EP2014041-009	EP2014041-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**1.32**	**1.29**	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**16.4**	**15.1**	**63.4**	**0.03**	**1.64**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**4.85**	**4.55**	**57.5**	**0.03**	**1.34**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**15.6**	**14.4**	**60.3**	**0.03**	**1.53**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**100**	**98.1**	**94.1**	**103**	**98.0**
13C8-PFOA	----	0.02	%		**102**	**97.6**	**99.6**	**102**	**101**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW238_201215	0089_QC114_201215	0089_MW239_201215	0089_MW245_201215	0089_MW242_201215
				Sampling date / time	15-Dec-2020 12:20	15-Dec-2020 12:22	15-Dec-2020 12:40	15-Dec-2020 12:55	15-Dec-2020 13:15
Compound	CAS Number	LOR	Unit		EP2014041-011	EP2014041-012	EP2014041-013	EP2014041-014	EP2014041-015
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.04	8.08	8.07	7.93	8.09
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		434	428	390	540	362
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		286	75	37	30	51
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		190	193	221	441	198
Total Alkalinity as CaCO3	----	1	mg/L		190	193	221	441	198
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		48	56	65	2	29
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		38	35	31	28	36
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		86	84	93	136	80
Magnesium	7439-95-4	1	mg/L		16	16	19	15	13
Sodium	7440-23-5	1	mg/L		26	25	25	28	26
Potassium	7440-09-7	1	mg/L		4	4	4	6	2
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		5.87	6.01	6.64	9.64	5.58
ø Total Cations	----	0.01	meq/L		6.84	6.70	7.39	9.39	6.24
ø Ionic Balance	----	0.01	%		7.66	5.42	5.35	1.31	5.66
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		6	6	6	42	5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	0.03	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	0.05	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	0.02	0.03	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW238_201215	0089_QC114_201215	0089_MW239_201215	0089_MW245_201215	0089_MW242_201215
				Sampling date / time	15-Dec-2020 12:20	15-Dec-2020 12:22	15-Dec-2020 12:40	15-Dec-2020 12:55	15-Dec-2020 13:15
Compound	CAS Number	LOR	Unit		EP2014041-011	EP2014041-012	EP2014041-013	EP2014041-014	EP2014041-015
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.15**	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.05**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW238_201215	0089_QC114_201215	0089_MW239_201215	0089_MW245_201215	0089_MW242_201215
				Sampling date / time	15-Dec-2020 12:20	15-Dec-2020 12:22	15-Dec-2020 12:40	15-Dec-2020 12:55	15-Dec-2020 13:15
Compound	CAS Number	LOR	Unit		EP2014041-011	EP2014041-012	EP2014041-013	EP2014041-014	EP2014041-015
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.15**	**0.18**	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.02**	**0.18**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.10**	**0.18**	**0.02**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**105**	**102**	**98.5**	**103**	**102**
13C8-PFOA	----	0.02	%		**103**	**97.6**	**102**	**99.6**	**95.3**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW249_201215	0089_MW248_201215	----	----	----
				Sampling date / time	15-Dec-2020 13:35	15-Dec-2020 13:58	----	----	----
Compound	CAS Number	LOR	Unit		EP2014041-016	EP2014041-017	--------	--------	--------
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.00	7.92	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		636	1260	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		146	26	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		449	460	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		449	460	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		22	207	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		103	306	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		85	143	----	----	----
Magnesium	7439-95-4	1	mg/L		32	59	----	----	----
Sodium	7440-23-5	1	mg/L		97	195	----	----	----
Potassium	7440-09-7	1	mg/L		9	21	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		12.3	22.1	----	----	----
ø Total Cations	----	0.01	meq/L		11.3	21.0	----	----	----
ø Ionic Balance	----	0.01	%		4.27	2.60	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		19	15	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.17	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.15	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.15	0.99	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	0.03	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW249_201215	0089_MW248_201215	----	----	----
				Sampling date / time	15-Dec-2020 13:35	15-Dec-2020 13:58	----	----	----
Compound	CAS Number	LOR	Unit		EP2014041-016	EP2014041-017	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.15**	**0.47**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.18**	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.04**	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.06**	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW249_201215	0089_MW248_201215	----	----	----
				Sampling date / time	15-Dec-2020 13:35	15-Dec-2020 13:58	----	----	----
Compound	CAS Number	LOR	Unit		EP2014041-016	EP2014041-017	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.30**	**2.09**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.30**	**1.46**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.30**	**1.91**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**100**	**101**	----	----	----
13C8-PFOA	----	0.02	%		**98.0**	**103**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014041**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17131	Issue Date	: 30-Dec-2020
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 17		
No. of samples analysed	: 17		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3438204)									
EP2014041-002	0089_MW517_201215	EA005-P: pH Value	----	0.01	pH Unit	8.12	8.11	0.123	0% - 20%
EP2014041-012	0089_QC114_201215	EA005-P: pH Value	----	0.01	pH Unit	8.08	8.06	0.248	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3435527)									
EP2014041-009	0089_MW243_201215	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	536	498	7.44	0% - 20%
EP2014041-001	0089_MW233_201215	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	196	196	0.00	0% - 50%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3435528)									
EP2014041-011	0089_MW238_201215	EA025H: Suspended Solids (SS)	----	5	mg/L	286	310	7.88	0% - 20%
EP2014041-001	0089_MW233_201215	EA025H: Suspended Solids (SS)	----	5	mg/L	30	32	6.45	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3438203)									
EP2014041-002	0089_MW517_201215	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	192	196	1.91	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	192	196	1.91	0% - 20%
EP2014041-012	0089_QC114_201215	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	193	191	0.978	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	193	191	0.978	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3424724)									
EP2014041-001	0089_MW233_201215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	6	0.00	No Limit
EP2014041-011	0089_MW238_201215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	48	47	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3424725)									
EP2014041-001	0089_MW233_201215	ED045G: Chloride	16887-00-6	1	mg/L	19	19	0.00	0% - 50%
EP2014041-011	0089_MW238_201215	ED045G: Chloride	16887-00-6	1	mg/L	38	37	2.81	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426594)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3426594) - continued									
EP2013993-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	58	59	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	18	18	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	122	122	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.00	0% - 50%
EP2014041-002	0089_MW517_201215	ED093F: Calcium	7440-70-2	1	mg/L	57	60	3.68	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	8	8	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	40	41	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3426595)									
EP2014041-012	0089_QC114_201215	ED093F: Calcium	7440-70-2	1	mg/L	84	86	2.78	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	16	16	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	25	26	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
EP2014093-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	28	29	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	30	30	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	55	56	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	21	21	0.00	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3424660)									
EP2014041-001	0089_MW233_201215	EP005: Total Organic Carbon	----	1	mg/L	8	8	0.00	No Limit
EP2014041-011	0089_MW238_201215	EP005: Total Organic Carbon	----	1	mg/L	6	6	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3435756)									
EP2014041-006	0089_MW216_201215	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.36	0.33	9.57	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.62	0.60	2.92	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	4.22	4.22	0.00	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.11	0.10	12.1	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3435756)									
EP2014041-006	0089_MW216_201215	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.26	0.25	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	4.78	4.56	4.72	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	2.88	2.73	5.31	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.37	0.34	8.10	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.8	0.7	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3435756)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3435756) - continued									
EP2014041-006	0089_MW216_201215	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3435756)									
EP2014041-006	0089_MW216_201215	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	1.32	1.32	0.00	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3438204)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3435527)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	98.8	88.1	114
				<10	1000 mg/L	98.4	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3435528)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	95.7	89.1	120
				<5	1000 mg/L	97.6	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3438203)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	114	81.2	126
				<1	200 mg/L	99.6	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3424724)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	87.7	113
				<1	500 mg/L	103	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3424725)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	87.9	114
				<1	1000 mg/L	99.8	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426594)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.3	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.0	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.3	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	90.4	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3426595)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.5	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.3	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.0	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3424660)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	110	87.2	116
				<1	100 mg/L	108	87.2	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3435756)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	----	µg/L	----	0.25 µg/L	73.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	71.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	71.6	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	71.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	68.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	127	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3435756)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	73.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	72.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	74.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	75.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	78.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	87.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	81.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	74.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3435756)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	85.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	95.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	79.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	81.4	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	74.2	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	75.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	75.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3435756)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	77.0	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	123	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	72.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	71.8	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3424724)							
EP2014041-001	0089_MW233_201215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	101	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3424725)							
EP2014041-001	0089_MW233_201215	ED045G: Chloride	16887-00-6	1000 mg/L	98.8	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3424660)							
EP2014041-002	0089_MW517_201215	EP005: Total Organic Carbon	----	100 mg/L	107	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3435756)							
EP2014041-015	0089_MW242_201215	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	83.6	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	89.0	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	85.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	75.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	77.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	132	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3435756)							
EP2014041-015	0089_MW242_201215	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	75.6	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	83.6	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	78.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	83.6	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	80.4	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	77.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	88.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	84.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	93.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	85.5	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3435756)							
EP2014041-015	0089_MW242_201215	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	83.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	93.8	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	81.0	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	89.1	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	81.7	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	88.0	65.0	136

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3435756) - continued							
EP2014041-015	0089_MW242_201215	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	85.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3435756)							
EP2014041-015	0089_MW242_201215	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	83.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	65.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	85.4	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	88.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014041**	Page	: 1 of 10
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 30-Dec-2020
Sampler	: [redacted] [redacted]	No. of samples received	: 17
Order number	: DEF19009/730	No. of samples analysed	: 17

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW233_201215,	0089_MW517_201215,	----	----	----	23-Dec-2020	15-Dec-2020	**8**
0089_MW224_201215,	0089_MW217_201215,						
0089_MW282_201215,	0089_MW216_201215,						
0089_QC113_201215,	0089_MW236_201215,						
0089_MW243_201215,	0089_MW240_201215,						
0089_MW238_201215,	0089_QC114_201215,						
0089_MW239_201215,	0089_MW245_201215,						
0089_MW242_201215,	0089_MW249_201215,						
0089_MW248_201215							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW233_201215, 0089_MW517_201215, 0089_MW224_201215, 0089_MW217_201215, 0089_MW282_201215, 0089_MW216_201215, 0089_QC113_201215, 0089_MW236_201215, 0089_MW243_201215, 0089_MW240_201215, 0089_MW238_201215, 0089_QC114_201215, 0089_MW239_201215, 0089_MW245_201215, 0089_MW242_201215, 0089_MW249_201215, 0089_MW248_201215	**15-Dec-2020**	**----**	----	----	**23-Dec-2020**	15-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW233_201215, 0089_MW517_201215, 0089_MW224_201215, 0089_MW217_201215, 0089_MW282_201215, 0089_MW216_201215, 0089_QC113_201215, 0089_MW236_201215, 0089_MW243_201215, 0089_MW240_201215, 0089_MW238_201215, 0089_QC114_201215, 0089_MW239_201215, 0089_MW245_201215, 0089_MW242_201215, 0089_MW249_201215, 0089_MW248_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW233_201215, 0089_MW517_201215, 0089_MW224_201215, 0089_MW217_201215, 0089_MW282_201215, 0089_MW216_201215, 0089_QC113_201215, 0089_MW236_201215, 0089_MW243_201215, 0089_MW240_201215, 0089_MW238_201215, 0089_QC114_201215, 0089_MW239_201215, 0089_MW245_201215, 0089_MW242_201215, 0089_MW249_201215, 0089_MW248_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW233_201215, 0089_MW224_201215, 0089_MW282_201215, 0089_QC113_201215, 0089_MW243_201215, 0089_MW238_201215, 0089_MW239_201215, 0089_MW242_201215, 0089_MW248_201215, 0089_MW517_201215, 0089_MW217_201215, 0089_MW216_201215, 0089_MW236_201215, 0089_MW240_201215, 0089_QC114_201215, 0089_MW245_201215, 0089_MW249_201215,	**15-Dec-2020**	**----**	----	----	**23-Dec-2020**	29-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW233_201215, 0089_MW224_201215, 0089_MW282_201215, 0089_QC113_201215, 0089_MW243_201215, 0089_MW238_201215, 0089_MW239_201215, 0089_MW242_201215, 0089_MW248_201215, 0089_MW517_201215, 0089_MW217_201215, 0089_MW216_201215, 0089_MW236_201215, 0089_MW240_201215, 0089_QC114_201215, 0089_MW245_201215, 0089_MW249_201215,	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW233_201215, 0089_MW224_201215, 0089_MW282_201215, 0089_QC113_201215, 0089_MW243_201215, 0089_MW238_201215, 0089_MW239_201215, 0089_MW242_201215, 0089_MW248_201215, 0089_MW517_201215, 0089_MW217_201215, 0089_MW216_201215, 0089_MW236_201215, 0089_MW240_201215, 0089_QC114_201215, 0089_MW245_201215, 0089_MW249_201215,	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW233_201215, 0089_MW517_201215, 0089_MW224_201215, 0089_MW217_201215, 0089_MW282_201215, 0089_MW216_201215, 0089_QC113_201215, 0089_MW236_201215, 0089_MW243_201215, 0089_MW240_201215, 0089_MW238_201215, 0089_QC114_201215, 0089_MW239_201215, 0089_MW245_201215, 0089_MW242_201215, 0089_MW249_201215, 0089_MW248_201215	**15-Dec-2020**	**----**	----	----	**18-Dec-2020**	22-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW233_201215, 0089_MW517_201215, 0089_MW224_201215, 0089_MW217_201215, 0089_MW282_201215, 0089_MW216_201215, 0089_QC113_201215, 0089_MW236_201215, 0089_MW243_201215, 0089_MW240_201215, 0089_MW238_201215, 0089_QC114_201215, 0089_MW239_201215, 0089_MW245_201215, 0089_MW242_201215, 0089_MW249_201215, 0089_MW248_201215	**15-Dec-2020**	**----**	----	----	**16-Dec-2020**	12-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW233_201215, 0089_MW517_201215, 0089_MW224_201215, 0089_MW217_201215, 0089_MW282_201215, 0089_MW216_201215, 0089_QC113_201215, 0089_MW236_201215, 0089_MW243_201215, 0089_MW240_201215, 0089_MW238_201215, 0089_QC114_201215, 0089_MW239_201215, 0089_MW245_201215, 0089_MW242_201215, 0089_MW249_201215, 0089_MW248_201215	**15-Dec-2020**	**22-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	13-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW233_201215, 0089_MW517_201215, 0089_MW224_201215, 0089_MW217_201215, 0089_MW282_201215, 0089_MW216_201215, 0089_QC113_201215, 0089_MW236_201215, 0089_MW243_201215, 0089_MW240_201215, 0089_MW238_201215, 0089_QC114_201215, 0089_MW239_201215, 0089_MW245_201215, 0089_MW242_201215, 0089_MW249_201215, 0089_MW248_201215	**15-Dec-2020**	**22-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	13-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW233_201215, 0089_MW517_201215, 0089_MW224_201215, 0089_MW217_201215, 0089_MW282_201215, 0089_MW216_201215, 0089_QC113_201215, 0089_MW236_201215, 0089_MW243_201215, 0089_MW240_201215, 0089_MW238_201215, 0089_QC114_201215, 0089_MW239_201215, 0089_MW245_201215, 0089_MW242_201215, 0089_MW249_201215, 0089_MW248_201215	**15-Dec-2020**	**22-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	13-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW233_201215, 0089_MW517_201215, 0089_MW224_201215, 0089_MW217_201215, 0089_MW282_201215, 0089_MW216_201215, 0089_QC113_201215, 0089_MW236_201215, 0089_MW243_201215, 0089_MW240_201215, 0089_MW238_201215, 0089_QC114_201215, 0089_MW239_201215, 0089_MW245_201215, 0089_MW242_201215, 0089_MW249_201215, 0089_MW248_201215	**15-Dec-2020**	**22-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	13-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW233_201215, 0089_MW517_201215, 0089_MW224_201215, 0089_MW217_201215, 0089_MW282_201215, 0089_MW216_201215, 0089_QC113_201215, 0089_MW236_201215, 0089_MW243_201215, 0089_MW240_201215, 0089_MW238_201215, 0089_QC114_201215, 0089_MW239_201215, 0089_MW245_201215, 0089_MW242_201215, 0089_MW249_201215, 0089_MW248_201215	**15-Dec-2020**	**22-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	13-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	17	**5.88**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2014041**		
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17131	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 15-Dec-2020 16:40	Issue Date	: 16-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 10.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 17 / 17

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014041-001	15-Dec-2020 08:20	0089_MW233_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-002	15-Dec-2020 08:38	0089_MW517_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-003	15-Dec-2020 09:22	0089_MW224_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-004	15-Dec-2020 09:24	0089_MW217_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-005	15-Dec-2020 09:49	0089_MW282_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-006	15-Dec-2020 10:11	0089_MW216_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-007	15-Dec-2020 10:12	0089_QC113_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-008	15-Dec-2020 10:48	0089_MW236_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-009	15-Dec-2020 11:48	0089_MW243_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-010	15-Dec-2020 12:01	0089_MW240_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-011	15-Dec-2020 12:20	0089_MW238_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-012	15-Dec-2020 12:22	0089_QC114_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-013	15-Dec-2020 12:40	0089_MW239_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-014	15-Dec-2020 12:55	0089_MW245_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-015	15-Dec-2020 13:15	0089_MW242_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-016	15-Dec-2020 13:35	0089_MW249_201215	✓	✓	✓	✓	✓	✓	✓
EP2014041-017	15-Dec-2020 13:58	0089_MW248_201215	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014041-001	15-Dec-2020 08:20	0089_MW233_201215	✓
EP2014041-002	15-Dec-2020 08:38	0089_MW517_201215	✓
EP2014041-003	15-Dec-2020 09:22	0089_MW224_201215	✓
EP2014041-004	15-Dec-2020 09:24	0089_MW217_201215	✓
EP2014041-005	15-Dec-2020 09:49	0089_MW282_201215	✓
EP2014041-006	15-Dec-2020 10:11	0089_MW216_201215	✓
EP2014041-007	15-Dec-2020 10:12	0089_QC113_201215	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014041-008	15-Dec-2020 10:48	0089_MW236_201215	✓
EP2014041-009	15-Dec-2020 11:48	0089_MW243_201215	✓
EP2014041-010	15-Dec-2020 12:01	0089_MW240_201215	✓
EP2014041-011	15-Dec-2020 12:20	0089_MW238_201215	✓
EP2014041-012	15-Dec-2020 12:22	0089_QC114_201215	✓
EP2014041-013	15-Dec-2020 12:40	0089_MW239_201215	✓
EP2014041-014	15-Dec-2020 12:55	0089_MW245_201215	✓
EP2014041-015	15-Dec-2020 13:15	0089_MW242_201215	✓
EP2014041-016	15-Dec-2020 13:35	0089_MW249_201215	✓
EP2014041-017	15-Dec-2020 13:58	0089_MW248_201215	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ENMRG (ENMRG) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

(ALS) COC#: 17131 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted]D BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 15/12/20 1640	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW233		15/12/2020 08:20 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW517		15/12/2020 08:38 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW224		15/12/2020 09:22 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_MW217		15/12/2020 09:24 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_MW282		15/12/2020 09:49 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_MW216		15/12/2020 10:11 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		
007	0089_QC113		15/12/2020 10:12 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_MW236		15/12/2020 10:48 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_MW243		15/12/2020 11:48 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2014041

Telephone : + 61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 17131 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW240		15/12/2020 12:01 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
011	0089_MW238		15/12/2020 12:20 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
012	0089_QC114		15/12/2020 12:22 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
013	0089_MW239		15/12/2020 12:40 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
014	0089_MW245		15/12/2020 12:55 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
015	0089_MW242		15/12/2020 01:15 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		
016	0089_MW249		15/12/2020 01:35 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
017	0089_MW248		15/12/2020 01:58 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

(ALS) COC#: 17131 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW233	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW517	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW224	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW217	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW282	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: 17131 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW216	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_QC113	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW236	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_MW243	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_MW240	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_MW238	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: 17131 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

012	0089_QC114	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
013	0089_MW239	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
014	0089_MW245	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
015	0089_MW242	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
016	0089_MW249	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
017	0089_MW248	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 17131 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW233	HDPE (no PTFE)	20 mL	00350019170599	Grey	No	
001	0089_MW233	Amber TOC Vial - Sulfuric Acid	40 mL	00180220004376	Purple	No	
001	0089_MW233	Clear Plastic Bottle - Natural	250 mL	00070719041850	Green	No	
001	0089_MW233	HDPE (no PTFE)	20 mL	00350019170816	Grey	No	
002	0089_MW517	Clear Plastic Bottle - Natural	250 mL	00070719041844	Green	No	
002	0089_MW517	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049108	Purple	No	
002	0089_MW517	HDPE (no PTFE)	20 mL	00350019170516	Grey	No	
002	0089_MW517	HDPE (no PTFE)	20 mL	00350019170980	Grey	No	
003	0089_MW224	Clear Plastic Bottle - Natural	250 mL	00070719041856	Green	No	
003	0089_MW224	Amber TOC Vial - Sulfuric Acid	40 mL	00180220022425	Purple	No	
003	0089_MW224	HDPE (no PTFE)	20 mL	00350019170592	Grey	No	
003	0089_MW224	HDPE (no PTFE)	20 mL	00350019171049	Grey	No	
004	0089_MW217	Clear Plastic Bottle - Natural	250 mL	00070719041806	Green	No	
004	0089_MW217	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049076	Purple	No	
004	0089_MW217	HDPE (no PTFE)	20 mL	00350019170865	Grey	No	
004	0089_MW217	HDPE (no PTFE)	20 mL	00350019170497	Grey	No	
005	0089_MW282	Clear Plastic Bottle - Natural	250 mL	00070719041863	Green	No	
005	0089_MW282	HDPE (no PTFE)	20 mL	00350019170943	Grey	No	
005	0089_MW282	HDPE (no PTFE)	20 mL	00350019170971	Grey	No	
005	0089_MW282	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049305	Purple	No	
006	0089_MW216	Clear Plastic Bottle - Natural	250 mL	00070719041845	Green	No	
006	0089_MW216	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049149	Purple	No	
006	0089_MW216	HDPE (no PTFE)	20 mL	00350019170953	Grey	No	
006	0089_MW216	HDPE (no PTFE)	20 mL	00350019171030	Grey	No	
006	0089_MW216	HDPE (no PTFE)	20 mL	00350019170681	Grey	No	
006	0089_MW216	HDPE (no PTFE)	20 mL	00350019170926	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 17131 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_QC113	Clear Plastic Bottle - Natural	250 mL	00070719041829	Green	No	
007	0089_QC113	HDPE (no PTFE)	20 mL	00350019170793	Grey	No	
007	0089_QC113	HDPE (no PTFE)	20 mL	00350019170975	Grey	No	
007	0089_QC113	Amber TOC Vial - Sulfuric Acid	40 mL	00180220022414	Purple	No	
008	0089_MW236	Clear Plastic Bottle - Natural	250 mL	00070719041715	Green	No	
008	0089_MW236	HDPE (no PTFE)	20 mL	00352005006437	Grey	No	
008	0089_MW236	HDPE (no PTFE)	20 mL	00352005006348	Grey	No	
008	0089_MW236	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049098	Purple	No	
009	0089_MW243	Clear Plastic Bottle - Natural	250 mL	00070719041801	Green	No	
009	0089_MW243	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049130	Purple	No	
009	0089_MW243	HDPE (no PTFE)	20 mL	00352005006455	Grey	No	
009	0089_MW243	HDPE (no PTFE)	20 mL	00352005006315	Grey	No	
010	0089_MW240	Clear Plastic Bottle - Natural	250 mL	00070719041726	Green	No	
010	0089_MW240	HDPE (no PTFE)	20 mL	00350019126741	Grey	No	
010	0089_MW240	HDPE (no PTFE)	20 mL	00350019102605	Grey	No	
010	0089_MW240	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048980	Purple	No	
011	0089_MW238	Clear Plastic Bottle - Natural	250 mL	00070719041745	Green	No	
011	0089_MW238	HDPE (no PTFE)	20 mL	00350019127005	Grey	No	
011	0089_MW238	HDPE (no PTFE)	20 mL	00350019102412	Grey	No	
011	0089_MW238	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049028	Purple	No	
012	0089_QC114	Clear Plastic Bottle - Natural	250 mL	00070719041819	Green	No	
012	0089_QC114	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049012	Purple	No	
012	0089_QC114	HDPE (no PTFE)	20 mL	00350019170902	Grey	No	
012	0089_QC114	HDPE (no PTFE)	20 mL	00350019170771	Grey	No	
013	0089_MW239	Clear Plastic Bottle - Natural	250 mL	00070719041807	Green	No	
013	0089_MW239	HDPE (no PTFE)	20 mL	00350019126835	Grey	No	
013	0089_MW239	HDPE (no PTFE)	20 mL	00350019126749	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: 17131 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:
QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

013	0089_MW239	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049100	Purple	No	
014	0089_MW245	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049314	Purple	No	
014	0089_MW245	Clear Plastic Bottle - Natural	250 mL	00070719041789	Green	No	
014	0089_MW245	HDPE (no PTFE)	20 mL	00350019170950	Grey	No	
014	0089_MW245	HDPE (no PTFE)	20 mL	00350019170664	Grey	No	
015	0089_MW242	Amber TOC Vial - Sulfuric Acid	40 mL	00180220004035	Purple	No	
015	0089_MW242	Clear Plastic Bottle - Natural	250 mL	00070719041841	Green	No	
015	0089_MW242	HDPE (no PTFE)	20 mL	00350019170737	Grey	No	
015	0089_MW242	HDPE (no PTFE)	20 mL	00350019170969	Grey	No	
015	0089_MW242	HDPE (no PTFE)	20 mL	00350019170672	Grey	No	
015	0089_MW242	HDPE (no PTFE)	20 mL	00350019170945	Grey	No	
016	0089_MW249	HDPE (no PTFE)	20 mL	00350019170538	Grey	No	
016	0089_MW249	HDPE (no PTFE)	20 mL	00350019170799	Grey	No	
016	0089_MW249	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049203	Purple	No	
016	0089_MW249	Clear Plastic Bottle - Natural	250 mL	00070719041812	Green	No	
017	0089_MW248	Clear Plastic Bottle - Natural	250 mL	00070719041869	Green	No	
017	0089_MW248	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049316	Purple	No	
017	0089_MW248	HDPE (no PTFE)	20 mL	00350019170939	Grey	No	
017	0089_MW248	HDPE (no PTFE)	20 mL	00350019170667	Grey	No	

Total Bottle Count: ALS: 72, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014042**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020 16:40
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17152	Issue Date	: 30-Dec-2020 16:24
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW226_201215	0089_MW289_201215	----	----	----
				Sampling date / time	15-Dec-2020 09:02	15-Dec-2020 12:24	----	----	----
Compound	CAS Number	LOR	Unit		EP2014042-001	EP2014042-002	--------	--------	--------
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.66	7.97	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		29400	556	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		184	112	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		553	321	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		553	321	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2350	63	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		14700	46	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		452	94	----	----	----
Magnesium	7439-95-4	1	mg/L		1210	25	----	----	----
Sodium	7440-23-5	1	mg/L		8660	60	----	----	----
Potassium	7440-09-7	1	mg/L		529	8	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		475	9.02	----	----	----
ø Total Cations	----	0.01	meq/L		512	9.56	----	----	----
ø Ionic Balance	----	0.01	%		3.82	2.90	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		50	8	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.04	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.05	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	0.30	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	0.03	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW226_201215	0089_MW289_201215	----	----	----
				Sampling date / time	15-Dec-2020 09:02	15-Dec-2020 12:24	----	----	----
Compound	CAS Number	LOR	Unit		EP2014042-001	EP2014042-002	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**1.42**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.03**	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.02**	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW226_201215	0089_MW289_201215	----	----	----
				Sampling date / time	15-Dec-2020 09:02	15-Dec-2020 12:24	----	----	----
Compound	CAS Number	LOR	Unit		EP2014042-001	EP2014042-002	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**1.89**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**1.72**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**1.81**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.3**	**104**	----	----	----
13C8-PFOA	----	0.02	%		**96.1**	**103**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014042**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17152	Issue Date	: 30-Dec-2020
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3438204)									
EP2014041-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.12	8.11	0.123	0% - 20%
EP2014041-012	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.08	8.06	0.248	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3435562)									
EP2014051-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3910	4130	5.42	0% - 20%
EP2014004-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	428	421	1.65	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3435564)									
EP2014042-001	0089_MW226_201215	EA025H: Suspended Solids (SS)	----	5	mg/L	184	204	10.1	0% - 20%
EP2014155-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	236	230	2.58	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3438203)									
EP2014041-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	192	196	1.91	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	192	196	1.91	0% - 20%
EP2014041-012	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	193	191	0.978	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	193	191	0.978	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3424724)									
EP2014041-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	6	0.00	No Limit
EP2014041-011	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	48	47	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3424725)									
EP2014041-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19	19	0.00	0% - 50%
EP2014041-011	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	38	37	2.81	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426603)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3426603) - continued									
EP2014042-001	0089_MW226_201215	ED093F: Calcium	7440-70-2	1	mg/L	452	425	6.22	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1210	1140	5.18	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	8660	8240	5.06	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	529	502	5.31	0% - 20%
EP2014045-009	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3424660)									
EP2014041-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	8	8	0.00	No Limit
EP2014041-011	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	6	6	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3435756)									
EP2014041-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.36	0.33	9.57	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.62	0.60	2.92	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	4.22	4.22	0.00	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.11	0.10	12.1	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3435756)									
EP2014041-006	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.26	0.25	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	4.78	4.56	4.72	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	2.88	2.73	5.31	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.37	0.34	8.10	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.8	0.7	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3435756)									
EP2014041-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3435756) - continued									
EP2014041-006	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3435756)									
EP2014041-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	1.32	1.32	0.00	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3438204)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3435562)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3435564)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	1000 mg/L	103	89.1	120
				<5	150 mg/L	103	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3438203)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	114	81.2	126
				<1	200 mg/L	99.6	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3424724)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	87.7	113
				<1	500 mg/L	103	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3424725)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	87.9	114
				<1	1000 mg/L	99.8	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426603)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.4	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.3	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.7	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.4	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3424660)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	110	87.2	116
				<1	100 mg/L	108	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3435756)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	----	µg/L	----	0.25 µg/L	73.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	71.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	71.6	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	71.8	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3435756) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	68.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	127	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3435756)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	73.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	72.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	74.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	75.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	78.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	87.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	81.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	74.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3435756)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	85.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	95.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	79.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	81.4	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	74.2	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	75.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	75.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3435756)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	77.0	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	123	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	72.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	71.8	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3424724)							
EP2014041-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	101	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3424725)							
EP2014041-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	98.8	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3424660)							
EP2014041-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	107	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3435756)							
EP2014041-015	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	83.6	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	89.0	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	85.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	75.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	77.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	132	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3435756)							
EP2014041-015	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	75.6	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	83.6	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	78.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	83.6	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	80.4	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	77.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	88.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	84.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	93.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	85.5	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3435756)							
EP2014041-015	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	83.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	93.8	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	81.0	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	89.1	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	81.7	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	88.0	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	85.0	61.0	135

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3435756)							
EP2014041-015	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	83.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	65.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	85.4	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	88.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014042**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 30-Dec-2020
Sampler	: [redacted] [redacted]	No. of samples received	: 2
Order number	: DEF19009/730	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW226_201215, 0089_MW289_201215	----	----	----	23-Dec-2020	15-Dec-2020	**8**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**----**	----	----	**23-Dec-2020**	15-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**----**	----	----	**23-Dec-2020**	29-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**----**	----	----	**21-Dec-2020**	22-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**----**	----	----	**16-Dec-2020**	12-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**22-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	13-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**22-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	13-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**22-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	13-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**22-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	13-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW226_201215, 0089_MW289_201215	**15-Dec-2020**	**22-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	13-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	14	**14.29**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	14	**14.29**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	14	**7.14**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014042**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17152	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 15-Dec-2020 16:40	Issue Date	: 16-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 10.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014042-001	15-Dec-2020 09:02	0089_MW226_201215	✓	✓	✓	✓	✓	✓	✓
EP2014042-002	15-Dec-2020 12:24	0089_MW289_201215	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014042-001	15-Dec-2020 09:02	0089_MW226_201215	✓
EP2014042-002	15-Dec-2020 12:24	0089_MW289_201215	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ENMRG (ENMRG) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 17152 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted] BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 15/12/20 1640	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW226		15/12/2020 09:02 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW289		15/12/2020 12:24 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2014042

Telephone : 61-8-9406 1301

CHAIN OF CUSTODY

COC#: 17152 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:
QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

~~LABORATORY USE ONLY (Circle)~~

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW226	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW289	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 17152 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW226	Clear Plastic Bottle - Natural	250 mL	00070719041833	Green	No	
001	0089_MW226	HDPE (no PTFE)	20 mL	00350019170484	Grey	No	
001	0089_MW226	HDPE (no PTFE)	20 mL	00350019170877	Grey	No	
001	0089_MW226	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049208	Purple	No	
002	0089_MW289	Clear Plastic Bottle - Natural	250 mL	00070719041790	Green	No	
002	0089_MW289	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049070	Purple	No	
002	0089_MW289	HDPE (no PTFE)	20 mL	00350019170659	Grey	No	
002	0089_MW289	HDPE (no PTFE)	20 mL	00350019170709	Grey	No	

Total Bottle Count: ALS: 8, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014043**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 18-Dec-2020 16:10
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17153	Issue Date	: 31-Dec-2020 13:36
Sampler	: [redacted]		
Site	: NC DEF19009/Stirling SED		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD409_201215	0089_SD411_201215	0089_SD413_201215	0089_SD415_201215	0089_SD346_201215
				Sampling date / time	15-Dec-2020 08:58	15-Dec-2020 09:57	15-Dec-2020 09:57	15-Dec-2020 09:58	15-Dec-2020 12:25
					EP2014043-001	EP2014043-002	EP2014043-003	EP2014043-004	EP2014043-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**8.8**	**9.0**	**8.9**	**8.9**	**9.0**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**2890**	**3010**	**4290**	**3440**	**629**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**28.7**	**14.5**	**31.0**	**24.2**	**33.6**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**4.0**	**2.7**	**3.7**	**2.7**	**6.2**
Exchangeable Magnesium	----	0.1	meq/100g		**0.5**	**0.3**	**0.4**	**0.3**	**1.0**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		**0.1**	**0.2**	**0.2**	**0.2**	<0.1
Cation Exchange Capacity	----	0.1	meq/100g		**4.7**	**3.2**	**4.4**	**3.2**	**7.3**
Exchangeable Sodium Percent	----	0.1	%		**3.0**	**5.0**	**3.8**	**4.9**	**1.2**
EP004: Organic Matter									
Organic Matter	----	0.5	%		**0.6**	<0.5	**0.7**	**0.8**	**1.5**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0002**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0094**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD409_201215	0089_SD411_201215	0089_SD413_201215	0089_SD415_201215	0089_SD346_201215
				Sampling date / time	15-Dec-2020 08:58	15-Dec-2020 09:57	15-Dec-2020 09:57	15-Dec-2020 09:58	15-Dec-2020 12:25
Compound	CAS Number	LOR	Unit		EP2014043-001	EP2014043-002	EP2014043-003	EP2014043-004	EP2014043-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0096**

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD409_201215	0089_SD411_201215	0089_SD413_201215	0089_SD415_201215	0089_SD346_201215
				Sampling date / time	15-Dec-2020 08:58	15-Dec-2020 09:57	15-Dec-2020 09:57	15-Dec-2020 09:58	15-Dec-2020 12:25
					EP2014043-001	EP2014043-002	EP2014043-003	EP2014043-004	EP2014043-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0096**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0096**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**110**	**106**	**104**	**109**	**111**
13C8-PFOA	----	0.0002	%		**105**	**97.5**	**93.5**	**102**	**102**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014043**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 18-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17153	Issue Date	: 31-Dec-2020
Sampler	: [redacted]		
Site	: NC DEF19009/Stirling SED		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3433117)									
EP2014043-001	0089_SD409_201215	EA002: pH Value	----	0.1	pH Unit	8.8	9.0	1.57	0% - 20%
EP2014091-005	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.6	9.5	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3433116)									
EP2014043-001	0089_SD409_201215	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	2890	2900	0.345	0% - 20%
EP2014091-005	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	1320	1330	0.151	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3435057)									
EP2014043-001	0089_SD409_201215	EA055: Moisture Content	----	0.1	%	28.7	28.3	1.29	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3435037)									
EP2014043-001	0089_SD409_201215	ED008: Exchangeable Sodium Percent	----	0.1	%	3.0	2.7	10.6	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	4.0	4.3	6.96	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.6	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.1	0.1	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	4.7	5.1	7.15	0% - 20%
EP2014091-005	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	5.2	5.2	0.00	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	4.2	4.0	5.73	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.4	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	4.9	4.6	5.70	0% - 20%
EP004: Organic Matter (QC Lot: 3435040)									
EP2014043-001	0089_SD409_201215	EP004: Organic Matter	----	0.5	%	0.6	0.5	0.00	No Limit
EP2014091-006	Anonymous	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3439526)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3439526) - continued									
EP2014043-001	0089_SD409_201215	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
ES2045411-035	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3439526)									
EP2014043-001	0089_SD409_201215	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
ES2045411-035	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3439526)									
EP2014043-001	0089_SD409_201215	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3439526) - continued									
EP2014043-001	0089_SD409_201215	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES2045411-035	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3439526)									
EP2014043-001	0089_SD409_201215	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES2045411-035	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3433117)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	102	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3433116)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
ED008: Exchangeable Cations (QCLot: 3435037)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	97.6	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	95.2	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	104	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	106	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	97.8	79.9	110
EP004: Organic Matter (QCLot: 3435040)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	92.2	70.0	120
				<0.5	85 %	87.5	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3439526)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3439526)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	96.1	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	110	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3439526)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3439526) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	98.4	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	112	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.7	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	90.4	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3439526)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	111	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	114	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	106	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	97.2	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3439526)							
EP2014043-001	0089_SD409_201215	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	108	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	103	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	96.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	102	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	115	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	88.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3439526)							
EP2014043-001	0089_SD409_201215	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	94.8	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	104	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	104	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	105	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	103	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	113	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3439526) - continued							
EP2014043-001	0089_SD409_201215	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	107	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	98.0	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	91.6	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	103	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3439526)							
EP2014043-001	0089_SD409_201215	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	106	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	99.7	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	104	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	92.5	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	89.3	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	100	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	110	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3439526)							
EP2014043-001	0089_SD409_201215	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	106	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	111	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	99.2	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	94.8	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014043**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 18-Dec-2020
Site	: NC DEF19009/Stirling SED	Issue Date	: 31-Dec-2020
Sampler	: [redacted] [redacted]	No. of samples received	: 5
Order number	: DEF19009/730	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD409_201215, 0089_SD411_201215, 0089_SD413_201215, 0089_SD415_201215, 0089_SD346_201215	**15-Dec-2020**	**21-Dec-2020**	22-Dec-2020	✓	**21-Dec-2020**	21-Dec-2020	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD409_201215, 0089_SD411_201215, 0089_SD413_201215, 0089_SD415_201215, 0089_SD346_201215	**15-Dec-2020**	**21-Dec-2020**	22-Dec-2020	✓	**21-Dec-2020**	18-Jan-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD409_201215, 0089_SD411_201215, 0089_SD413_201215, 0089_SD415_201215, 0089_SD346_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	29-Dec-2020	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD409_201215, 0089_SD411_201215, 0089_SD413_201215, 0089_SD415_201215, 0089_SD346_201215	**15-Dec-2020**	**23-Dec-2020**	12-Jan-2021	✓	**23-Dec-2020**	12-Jan-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD409_201215, 0089_SD411_201215, 0089_SD413_201215, 0089_SD415_201215, 0089_SD346_201215	**15-Dec-2020**	**23-Dec-2020**	12-Jan-2021	✓	**23-Dec-2020**	12-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD409_201215, 0089_SD411_201215, 0089_SD413_201215, 0089_SD415_201215, 0089_SD346_201215	**15-Dec-2020**	**24-Dec-2020**	13-Jun-2021	✓	**29-Dec-2020**	02-Feb-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD409_201215, 0089_SD411_201215, 0089_SD413_201215, 0089_SD415_201215, 0089_SD346_201215	**15-Dec-2020**	**24-Dec-2020**	13-Jun-2021	✓	**29-Dec-2020**	02-Feb-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD409_201215, 0089_SD411_201215, 0089_SD413_201215, 0089_SD415_201215, 0089_SD346_201215	**15-Dec-2020**	**24-Dec-2020**	13-Jun-2021	✓	**29-Dec-2020**	02-Feb-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD409_201215, 0089_SD411_201215, 0089_SD413_201215, 0089_SD415_201215, 0089_SD346_201215	**15-Dec-2020**	**24-Dec-2020**	13-Jun-2021	✓	**29-Dec-2020**	02-Feb-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD409_201215, 0089_SD411_201215, 0089_SD413_201215, 0089_SD415_201215, 0089_SD346_201215	**15-Dec-2020**	**24-Dec-2020**	13-Jun-2021	✓	**29-Dec-2020**	02-Feb-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
Sample Extraction for PFAS in solid matrices	ORG73	SOIL	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014043**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17153	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: NC DEF19009/Stirling SED		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 18-Dec-2020 16:10	Issue Date	: 18-Dec-2020
Client Requested Due Date	: 31-Dec-2020	Scheduled Reporting Date	: **31-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 17.1
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2014043-001	15-Dec-2020 08:58	0089_SD409_201215	✓	✓	✓	✓
EP2014043-002	15-Dec-2020 09:57	0089_SD411_201215	✓	✓	✓	✓
EP2014043-003	15-Dec-2020 09:57	0089_SD413_201215	✓	✓	✓	✓
EP2014043-004	15-Dec-2020 09:58	0089_SD415_201215	✓	✓	✓	✓
EP2014043-005	15-Dec-2020 12:25	0089_SD346_201215	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ENMRG (ENMRG) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 17153 ALS Laboratory: EP Perth

RELINQUISHED BY:	[redacted] BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 15/12/20 16:40 16/12 1610 16/12 1435	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD409		15/12/2020 08:58 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD411		15/12/2020 09:57 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD413		15/12/2020 09:57 AM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD415		15/12/2020 09:58 AM	Soil	ALS: 2 Non ALS: 0	No		X		
005	0089_SD346		15/12/2020 12:25 PM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division Perth

Work Order Reference

EP2014043

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 17153 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD409	Soil Glass Jar - Unpreserved	150 mL	00260220067818	Orange	No	
001	0089_SD409	HDPE Soil Jar	200 mL	00620719068309	Grey	No	
002	0089_SD411	HDPE Soil Jar	200 mL	00620719068374	Grey	No	
002	0089_SD411	Soil Glass Jar - Unpreserved	150 mL	00260220067739	Orange	No	
003	0089_SD413	HDPE Soil Jar	200 mL	00620719068310	Grey	No	
003	0089_SD413	Soil Glass Jar - Unpreserved	150 mL	00260220067727	Orange	No	
004	0089_SD415	Soil Glass Jar - Unpreserved	150 mL	00260220067851	Orange	No	
004	0089_SD415	HDPE Soil Jar	200 mL	00620719068303	Grey	No	
005	0089_SD346	HDPE Soil Jar	200 mL	00620719068355	Grey	No	
005	0089_SD346	Soil Glass Jar - Unpreserved	150 mL	00260220067720	Orange	No	

Total Bottle Count: ALS: 10, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014044**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 18-Dec-2020 16:10
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17155	Issue Date	: 31-Dec-2020 13:45
Sampler	: [redacted]		
Site	: NC DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 11		
No. of samples analysed	: 11		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **MARINE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SW410_201215	0089_SW412_201215	0089_SW414_201215	0089_SW416_201215	0089_PW411_201215
				Sampling date / time	15-Dec-2020 09:01	15-Dec-2020 10:04	15-Dec-2020 10:05	15-Dec-2020 10:07	15-Dec-2020 10:09
					EP2014044-002	EP2014044-003	EP2014044-004	EP2014044-005	EP2014044-006
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.94	7.99	8.02	8.08	7.75
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		39300	31700	39200	40200	39500
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		35	12	34	23	64
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		141	119	124	126	120
Total Alkalinity as CaCO3	----	1	mg/L		141	119	124	126	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2820	2820	2930	2900	2940
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19600	19100	19200	19800	19600
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		484	494	457	495	484
Magnesium	7439-95-4	1	mg/L		1540	1590	1460	1590	1550
Sodium	7440-23-5	1	mg/L		12000	12400	11400	12400	12100
Potassium	7440-09-7	1	mg/L		627	652	602	654	637
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		614	600	605	621	616
ø Total Cations	----	0.01	meq/L		689	712	654	712	694
ø Ionic Balance	----	0.01	%		5.71	8.52	3.90	6.77	5.94
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		4	4	4	3	6
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0089_SW410_201215	0089_SW412_201215	0089_SW414_201215	0089_SW416_201215	0089_PW411_201215
				Sampling date / time	15-Dec-2020 09:01	15-Dec-2020 10:04	15-Dec-2020 10:05	15-Dec-2020 10:07	15-Dec-2020 10:09
Compound	CAS Number	LOR	Unit		EP2014044-002	EP2014044-003	EP2014044-004	EP2014044-005	EP2014044-006
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0089_SW410_201215	0089_SW412_201215	0089_SW414_201215	0089_SW416_201215	0089_PW411_201215
				Sampling date / time	15-Dec-2020 09:01	15-Dec-2020 10:04	15-Dec-2020 10:05	15-Dec-2020 10:07	15-Dec-2020 10:09
Compound	CAS Number	LOR	Unit		EP2014044-002	EP2014044-003	EP2014044-004	EP2014044-005	EP2014044-006
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**107**	**106**	**107**	**112**	**109**
13C8-PFOA	----	0.02	%		**94.8**	**90.9**	**91.6**	**94.4**	**92.4**

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)			Sample ID	0089_PW413_201215	0089_PW415_201215	0089_PW346_201215	0089_SW373_201215	0089_SW372_201215
			Sampling date / time	15-Dec-2020 10:11	15-Dec-2020 10:12	15-Dec-2020 12:28	15-Dec-2020 12:29	15-Dec-2020 12:31
Compound	CAS Number	LOR	Unit	EP2014044-007	EP2014044-008	EP2014044-009	EP2014044-010	EP2014044-011
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.61	7.67	7.84	7.95	8.18
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	35400	38500	6410	31400	33000
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	30	45	55	23	27
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	125	126	153	92	104
Total Alkalinity as CaCO3	----	1	mg/L	125	126	153	92	104
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2900	2910	587	2790	2590
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	19600	19700	3230	15600	16600
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	496	505	90	379	395
Magnesium	7439-95-4	1	mg/L	1590	1640	269	1220	1270
Sodium	7440-23-5	1	mg/L	12600	12700	1810	9650	9870
Potassium	7440-09-7	1	mg/L	658	684	94	496	514
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	616	619	106	500	524
ø Total Cations	----	0.01	meq/L	720	730	108	552	567
ø Ionic Balance	----	0.01	%	7.84	8.25	0.64	4.92	3.89
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	7	<1	<1	4	4
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.07	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.07	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.45	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.03	<0.02	<0.02

Analytical Results

Sub-Matrix: MARINE WATER (Matrix: WATER)				Sample ID	0089_PW413_201215	0089_PW415_201215	0089_PW346_201215	0089_SW373_201215	0089_SW372_201215
				Sampling date / time	15-Dec-2020 10:11	15-Dec-2020 10:12	15-Dec-2020 12:28	15-Dec-2020 12:29	15-Dec-2020 12:31
Compound	CAS Number	LOR	Unit		EP2014044-007	EP2014044-008	EP2014044-009	EP2014044-010	EP2014044-011
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.02**	**2.71**	**0.05**	**0.04**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.10**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.03**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **MARINE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW413_201215	0089_PW415_201215	0089_PW346_201215	0089_SW373_201215	0089_SW372_201215
				Sampling date / time	15-Dec-2020 10:11	15-Dec-2020 10:12	15-Dec-2020 12:28	15-Dec-2020 12:29	15-Dec-2020 12:31
					EP2014044-007	EP2014044-008	EP2014044-009	EP2014044-010	EP2014044-011
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.02**	**3.46**	**0.05**	**0.04**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.02**	**3.16**	**0.05**	**0.04**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.02**	**3.36**	**0.05**	**0.04**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	**104**	**105**	**107**	**109**
13C8-PFOA	----	0.02	%		**89.8**	**93.4**	**94.2**	**92.7**	**92.7**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW409_201215	----	----	----	----
				Sampling date / time	15-Dec-2020 08:59	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2014044-001	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.54	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		35200	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		64	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		123	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		123	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2850	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19600	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		504	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1620	----	----	----	----
Sodium	7440-23-5	1	mg/L		12600	----	----	----	----
Potassium	7440-09-7	1	mg/L		667	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		615	----	----	----	----
ø Total Cations	----	0.01	meq/L		724	----	----	----	----
ø Ionic Balance	----	0.01	%		8.14	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		11	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW409_201215	----	----	----	----
				Sampling date / time	15-Dec-2020 08:59	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2014044-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW409_201215	----	----	----	----
				Sampling date / time	15-Dec-2020 08:59	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2014044-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**110**	----	----	----	----
13C8-PFOA	----	0.02	%		**90.9**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **MARINE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014044**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 18-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17155	Issue Date	: 31-Dec-2020
Sampler	: [redacted]		
Site	: NC DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 11		
No. of samples analysed	: 11		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3442744)									
EP2014044-002	0089_SW410_201215	EA005-P: pH Value	----	0.01	pH Unit	7.94	7.91	0.378	0% - 20%
EP2014077-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.00	7.99	0.125	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3435537)									
EP2014044-009	0089_PW346_201215	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	6410	6400	0.250	0% - 20%
EP2014044-001	0089_PW409_201215	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	35200	34300	2.59	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3435538)									
EP2014044-011	0089_SW372_201215	EA025H: Suspended Solids (SS)	----	5	mg/L	27	30	13.1	No Limit
EP2014044-001	0089_PW409_201215	EA025H: Suspended Solids (SS)	----	5	mg/L	64	62	3.58	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3442743)									
EP2014044-002	0089_SW410_201215	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	141	140	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	141	140	0.00	0% - 20%
EP2014077-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	114	114	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	114	114	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3434323)									
EP2014044-001	0089_PW409_201215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2850	2860	0.416	0% - 20%
EP2014044-011	0089_SW372_201215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2590	2600	0.275	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3434324)									
EP2014044-001	0089_PW409_201215	ED045G: Chloride	16887-00-6	1	mg/L	19600	19300	1.58	0% - 20%
EP2014044-011	0089_SW372_201215	ED045G: Chloride	16887-00-6	1	mg/L	16600	16700	1.07	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3433302)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3433302) - continued									
EP2014044-001	0089_PW409_201215	ED093F: Calcium	7440-70-2	1	mg/L	504	495	1.79	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1620	1600	1.47	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12600	12500	1.16	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	667	658	1.31	0% - 20%
EP2014044-011	0089_SW372_201215	ED093F: Calcium	7440-70-2	1	mg/L	395	395	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1270	1260	0.355	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9870	9810	0.617	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	514	510	0.644	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3436496)									
EP2014044-001	0089_PW409_201215	EP005: Total Organic Carbon	----	1	mg/L	11	10	0.00	0% - 50%
EP2014044-011	0089_SW372_201215	EP005: Total Organic Carbon	----	1	mg/L	4	1	120	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3442744)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3435537)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114
				<10	1000 mg/L	100	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3435538)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	111	89.1	120
				<5	1000 mg/L	102	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3442743)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	115	81.2	126
				<1	200 mg/L	99.4	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3434323)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	106	87.7	113
				<1	500 mg/L	111	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3434324)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	106	87.9	114
				<1	1000 mg/L	104	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3433302)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.9	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3436496)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	112	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3440798)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	91.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	87.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	88.2	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3440798) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	86.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	84.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3440798)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	82.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	81.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	81.0	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	97.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	83.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	83.2	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	80.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	83.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	80.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3440798)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	84.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	87.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	83.0	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	85.5	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	92.9	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	95.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	94.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3440798)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	82.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	89.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	122	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	96.2	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3434323)							
EP2014044-001	0089_PW409_201215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3434324)							
EP2014044-001	0089_PW409_201215	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3436496)							
EP2014044-002	0089_SW410_201215	EP005: Total Organic Carbon	----	100 mg/L	109	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014044**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 18-Dec-2020
Site	: NC DEF19009/Stirling SW/PW	Issue Date	: 31-Dec-2020
Sampler	: [redacted]	No. of samples received	: 11
Order number	: DEF19009/730	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2014044--001	0089_PW409_201215	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2014044--001	0089_PW409_201215	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_PW409_201215,	0089_SW410_201215,	----	----	----	29-Dec-2020	15-Dec-2020	**14**
0089_SW412_201215,	0089_SW414_201215,						
0089_SW416_201215,	0089_PW411_201215,						
0089_PW413_201215,	0089_PW415_201215,						
0089_PW346_201215,	0089_SW373_201215,						
0089_SW372_201215							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	11	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**----**	----	----	**29-Dec-2020**	15-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**----**	----	----	**29-Dec-2020**	29-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**----**	----	----	**21-Dec-2020**	22-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	12-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**24-Dec-2020**	13-Jun-2021	✓	**29-Dec-2020**	13-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**24-Dec-2020**	13-Jun-2021	✓	**29-Dec-2020**	13-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**24-Dec-2020**	13-Jun-2021	✓	**29-Dec-2020**	13-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**24-Dec-2020**	13-Jun-2021	✓	**29-Dec-2020**	13-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW409_201215, 0089_SW410_201215, 0089_SW412_201215, 0089_SW414_201215, 0089_SW416_201215, 0089_PW411_201215, 0089_PW413_201215, 0089_PW415_201215, 0089_PW346_201215, 0089_SW373_201215, 0089_SW372_201215	**15-Dec-2020**	**24-Dec-2020**	13-Jun-2021	✓	**29-Dec-2020**	13-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	11	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	**5.56**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	11	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014044**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17155	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: NC DEF19009/Stirling SW/PW		
Sampler	: [redacted]		

Dates

Date Samples Received	: 18-Dec-2020 16:10	Issue Date	: 18-Dec-2020
Client Requested Due Date	: 31-Dec-2020	Scheduled Reporting Date	: **31-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 17.1 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 11 / 11

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014044-001	15-Dec-2020 08:59	0089_PW409_201215	✓	✓	✓	✓	✓	✓	✓
EP2014044-002	15-Dec-2020 09:01	0089_SW410_201215	✓	✓	✓	✓	✓	✓	✓
EP2014044-003	15-Dec-2020 10:04	0089_SW412_201215	✓	✓	✓	✓	✓	✓	✓
EP2014044-004	15-Dec-2020 10:05	0089_SW414_201215	✓	✓	✓	✓	✓	✓	✓
EP2014044-005	15-Dec-2020 10:07	0089_SW416_201215	✓	✓	✓	✓	✓	✓	✓
EP2014044-006	15-Dec-2020 10:09	0089_PW411_201215	✓	✓	✓	✓	✓	✓	✓
EP2014044-007	15-Dec-2020 10:11	0089_PW413_201215	✓	✓	✓	✓	✓	✓	✓
EP2014044-008	15-Dec-2020 10:12	0089_PW415_201215	✓	✓	✓	✓	✓	✓	✓
EP2014044-009	15-Dec-2020 12:28	0089_PW346_201215	✓	✓	✓	✓	✓	✓	✓
EP2014044-010	15-Dec-2020 12:29	0089_SW373_201215	✓	✓	✓	✓	✓	✓	✓
EP2014044-011	15-Dec-2020 12:31	0089_SW372_201215	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014044-001	15-Dec-2020 08:59	0089_PW409_201215	✓
EP2014044-002	15-Dec-2020 09:01	0089_SW410_201215	✓
EP2014044-003	15-Dec-2020 10:04	0089_SW412_201215	✓
EP2014044-004	15-Dec-2020 10:05	0089_SW414_201215	✓
EP2014044-005	15-Dec-2020 10:07	0089_SW416_201215	✓
EP2014044-006	15-Dec-2020 10:09	0089_PW411_201215	✓
EP2014044-007	15-Dec-2020 10:11	0089_PW413_201215	✓
EP2014044-008	15-Dec-2020 10:12	0089_PW415_201215	✓
EP2014044-009	15-Dec-2020 12:28	0089_PW346_201215	✓
EP2014044-010	15-Dec-2020 12:29	0089_SW373_201215	✓
EP2014044-011	15-Dec-2020 12:31	0089_SW372_201215	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
0089_PW346_20121	Clear Plastic Bottle - Natural	----	15-Dec-2020	18-Dec-2020	✗	----	----
0089_PW409_20121	Clear Plastic Bottle - Natural	----	15-Dec-2020	18-Dec-2020	✗	----	----
0089_PW411_20121	Clear Plastic Bottle - Natural	----	15-Dec-2020	18-Dec-2020	✗	----	----
0089_PW413_20121	Clear Plastic Bottle - Natural	----	15-Dec-2020	18-Dec-2020	✗	----	----
0089_PW415_20121	Clear Plastic Bottle - Natural	----	15-Dec-2020	18-Dec-2020	✗	----	----
0089_SW372_20121	Clear Plastic Bottle - Natural	----	15-Dec-2020	18-Dec-2020	✗	----	----
0089_SW373_20121	Clear Plastic Bottle - Natural	----	15-Dec-2020	18-Dec-2020	✗	----	----
0089_SW410_20121	Clear Plastic Bottle - Natural	----	15-Dec-2020	18-Dec-2020	✗	----	----
0089_SW412_20121	Clear Plastic Bottle - Natural	----	15-Dec-2020	18-Dec-2020	✗	----	----
0089_SW414_20121	Clear Plastic Bottle - Natural	----	15-Dec-2020	18-Dec-2020	✗	----	----
0089_SW416_20121	Clear Plastic Bottle - Natural	----	15-Dec-2020	18-Dec-2020	✗	----	----

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]

- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ENMRG (ENMRG) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 17155 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 16/12/20 1610 16/12/20 1435	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW409		15/12/2020 08:59 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_SW410		15/12/2020 09:01 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_SW412		15/12/2020 10:04 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_SW414		15/12/2020 10:05 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_SW416		15/12/2020 10:07 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_PW411		15/12/2020 10:09 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_PW413		15/12/2020 10:11 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_PW415		15/12/2020 10:12 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_PW346		15/12/2020 12:28 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2014044

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: 17155 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SW373		15/12/2020 12:29 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
011	0089_SW372		15/12/2020 12:31 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

(ALS) COC#: **17155** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW409	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_SW410	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_SW412	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW414	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_SW416	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 17155 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW411	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW413	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_PW415	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_PW346	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_SW373	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_SW372	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 17155 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW409	Clear Plastic Bottle - Natural	250 mL	00070719041817	Green	No	
001	0089_PW409	HDPE (no PTFE)	20 mL	00350019170466	Grey	No	
001	0089_PW409	HDPE (no PTFE)	20 mL	00350019170847	Grey	No	
001	0089_PW409	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049102	Purple	No	
002	0089_SW410	Clear Plastic Bottle - Natural	250 mL	00070719041823	Green	No	
002	0089_SW410	HDPE (no PTFE)	20 mL	00350019171039	Grey	No	
002	0089_SW410	HDPE (no PTFE)	20 mL	00350019170972	Grey	No	
002	0089_SW410	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049004	Purple	No	
003	0089_SW412	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049169	Purple	No	
003	0089_SW412	HDPE (no PTFE)	20 mL	00350019170747	Grey	No	
003	0089_SW412	Clear Plastic Bottle - Natural	250 mL	00070719041770	Green	No	
003	0089_SW412	HDPE (no PTFE)	20 mL	00350019170629	Grey	No	
004	0089_SW414	Clear Plastic Bottle - Natural	250 mL	00070719041795	Green	No	
004	0089_SW414	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049104	Purple	No	
004	0089_SW414	HDPE (no PTFE)	20 mL	00350019170670	Grey	No	
004	0089_SW414	HDPE (no PTFE)	20 mL	00350019170786	Grey	No	
005	0089_SW416	Clear Plastic Bottle - Natural	250 mL	00070719041838	Green	No	
005	0089_SW416	Amber TOC Vial - Sulfuric Acid	40 mL	00180220022017	Purple	No	
005	0089_SW416	HDPE (no PTFE)	20 mL	00350019170621	Grey	No	
005	0089_SW416	HDPE (no PTFE)	20 mL	00350019170777	Grey	No	
006	0089_PW411	Clear Plastic Bottle - Natural	250 mL	00070719041763	Green	No	
006	0089_PW411	HDPE (no PTFE)	20 mL	00350019170688	Grey	No	
006	0089_PW411	HDPE (no PTFE)	20 mL	00350019170660	Grey	No	
006	0089_PW411	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048787	Purple	No	
007	0089_PW413	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049175	Purple	No	
007	0089_PW413	Clear Plastic Bottle - Natural	250 mL	00070719041762	Green	No	

CHAIN OF CUSTODY

ALS COC#: 17155 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: NC DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_PW413	HDPE (no PTFE)	20 mL	00350019170584	Grey	No	
007	0089_PW413	HDPE (no PTFE)	20 mL	00350019170571	Grey	No	
008	0089_PW415	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049125	Purple	No	
008	0089_PW415	Clear Plastic Bottle - Natural	250 mL	00070719041771	Green	No	
008	0089_PW415	HDPE (no PTFE)	20 mL	00350019170483	Grey	No	
008	0089_PW415	HDPE (no PTFE)	20 mL	00350019170507	Grey	No	
009	0089_PW346	Clear Plastic Bottle - Natural	250 mL	00070719041781	Green	No	
009	0089_PW346	HDPE (no PTFE)	20 mL	00350019170652	Grey	No	
009	0089_PW346	HDPE (no PTFE)	20 mL	00350019170733	Grey	No	
009	0089_PW346	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049000	Purple	No	
010	0089_SW373	HDPE (no PTFE)	20 mL	00350019170594	Grey	No	
010	0089_SW373	HDPE (no PTFE)	20 mL	00350019170708	Grey	No	
010	0089_SW373	Clear Plastic Bottle - Natural	250 mL	00070719041721	Green	No	
010	0089_SW373	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048900	Purple	No	
011	0089_SW372	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049026	Purple	No	
011	0089_SW372	Clear Plastic Bottle - Natural	250 mL	00070719041780	Green	No	
011	0089_SW372	HDPE (no PTFE)	20 mL	00350019170815	Grey	No	
011	0089_SW372	HDPE (no PTFE)	20 mL	00350019170626	Grey	No	

Total Bottle Count: ALS: 44, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014047**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020 16:40
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17147	Issue Date	: 30-Dec-2020 16:25
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 9		
No. of samples analysed	: 9		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW228_201215	0089_QC301_201215	0089_QC401_201215	0089_QC302_201215	0089_QC402_201215
			Sampling date / time	15-Dec-2020 08:31	15-Dec-2020 13:48	15-Dec-2020 13:50	15-Dec-2020 13:50	15-Dec-2020 13:50
Compound	CAS Number	LOR	Unit	EP2014047-001	EP2014047-002	EP2014047-003	EP2014047-004	EP2014047-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.73**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**21500**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**154**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**419**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**419**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**1510**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**9600**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**307**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**772**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**5400**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**296**	----	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**311**	----	----	----	----
ø Total Cations	----	0.01	meq/L	**321**	----	----	----	----
ø Ionic Balance	----	0.01	%	**1.69**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**22**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	**0.31**	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	**0.13**	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.11**	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW228_201215	0089_QC301_201215	0089_QC401_201215	0089_QC302_201215	0089_QC402_201215
				Sampling date / time	15-Dec-2020 08:31	15-Dec-2020 13:48	15-Dec-2020 13:50	15-Dec-2020 13:50	15-Dec-2020 13:50
Compound	CAS Number	LOR	Unit		EP2014047-001	EP2014047-002	EP2014047-003	EP2014047-004	EP2014047-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**4.2**	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**14.0**	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**15.0**	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**3.42**	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW228_201215	0089_QC301_201215	0089_QC401_201215	0089_QC302_201215	0089_QC402_201215
				Sampling date / time	15-Dec-2020 08:31	15-Dec-2020 13:48	15-Dec-2020 13:50	15-Dec-2020 13:50	15-Dec-2020 13:50
Compound	CAS Number	LOR	Unit		EP2014047-001	EP2014047-002	EP2014047-003	EP2014047-004	EP2014047-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**0.06**	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**37.2**	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.11**	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**37.1**	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**118**	**114**	**115**	**114**	**105**
13C8-PFOA	----	0.02	%		**99.0**	**101**	**104**	**105**	**99.3**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC303_201215	0089_QC403_201215	0089_QC404_201215	0089_QC304_201215	----
				Sampling date / time	15-Dec-2020 13:51	15-Dec-2020 13:51	15-Dec-2020 13:52	15-Dec-2020 13:53	----
Compound	CAS Number	LOR	Unit		EP2014047-006	EP2014047-007	EP2014047-008	EP2014047-009	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC303_201215	0089_QC403_201215	0089_QC404_201215	0089_QC304_201215	----
				Sampling date / time	15-Dec-2020 13:51	15-Dec-2020 13:51	15-Dec-2020 13:52	15-Dec-2020 13:53	----
Compound	CAS Number	LOR	Unit		EP2014047-006	EP2014047-007	EP2014047-008	EP2014047-009	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**110**	**101**	**97.2**	**95.3**	----
13C8-PFOA	----	0.02	%		**104**	**101**	**100**	**101**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014047**	Page	: 1 of 10
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 16-Dec-2020
C-O-C number	: 17147	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 9		
No. of samples analysed	: 9		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3438204)									
EP2014041-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.12	8.11	0.123	0% - 20%
EP2014041-012	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.08	8.06	0.248	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3435562)									
EP2014051-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3910	4130	5.42	0% - 20%
EP2014004-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	428	421	1.65	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3435564)									
EP2014042-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	184	204	10.1	0% - 20%
EP2014155-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	236	230	2.58	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3438203)									
EP2014041-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	192	196	1.91	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	192	196	1.91	0% - 20%
EP2014041-012	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	193	191	0.978	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	193	191	0.978	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3424783)									
EP2014047-001	0089_MW228_201215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1510	1530	1.00	0% - 20%
EP2014048-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2780	2770	0.423	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3424784)									
EP2014047-001	0089_MW228_201215	ED045G: Chloride	16887-00-6	1	mg/L	9600	9570	0.284	0% - 20%
EP2014048-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19600	19700	0.745	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426598)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3426598) - continued									
EP2014047-001	0089_MW228_201215	ED093F: Calcium	7440-70-2	1	mg/L	307	305	0.781	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	772	770	0.289	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	5400	5390	0.106	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	296	296	0.00	0% - 20%
EP2014048-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	510	481	5.80	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1580	1500	5.21	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12100	11500	5.08	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	696	656	5.97	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3424660)									
EP2014041-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	8	8	0.00	No Limit
EP2014041-011	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	6	6	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3436145)									
EP2014048-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3436260)									
EP2014047-001	0089_MW228_201215	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.31	0.26	15.6	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.13	0.13	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.11	0.10	14.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436145)									
EP2014048-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436260)									
EP2014047-001	0089_MW228_201215	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436260) - continued									
EP2014047-001	0089_MW228_201215	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	14.0	15.0	7.07	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	15.0	15.9	6.17	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	3.42	3.22	5.88	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	4.2	3.7	12.8	0% - 20%
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436145)									
EP2014048-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436260)									
EP2014047-001	0089_MW228_201215	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436145)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436145) - continued									
EP2014048-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436260)									
EP2014047-001	0089_MW228_201215	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.06	0.06	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3436145)									
EP2014048-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.01	<0.01	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3436260)									
EP2014047-001	0089_MW228_201215	EP231X: Sum of PFAS	----	0.01	µg/L	37.2	38.4	3.02	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3438204)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3435562)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3435564)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	1000 mg/L	103	89.1	120
				<5	150 mg/L	103	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3438203)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	114	81.2	126
				<1	200 mg/L	99.6	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3424783)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3424784)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.3	87.9	114
				<1	1000 mg/L	97.2	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426598)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.2	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.4	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3424660)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	110	87.2	116
				<1	100 mg/L	108	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436145)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	86.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	91.0	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	89.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	88.4	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436145) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	82.8	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436260)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	93.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	83.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	82.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	83.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	81.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436145)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	88.5	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	87.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	86.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	82.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	84.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	86.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	94.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.0	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	83.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	86.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	79.7	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436260)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	93.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	91.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	90.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	86.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	98.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	87.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	81.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436145)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	91.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	99.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	85.6	62.6	147

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436145) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	84.1	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	84.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	93.8	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436260)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	101	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	101	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	91.8	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	88.0	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	86.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	103	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436145)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	83.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	93.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	94.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	90.2	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436260)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	89.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	96.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	83.8	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3424783)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3424783) - continued							
EP2014047-001	0089_MW228_201215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3424784)							
EP2014047-001	0089_MW228_201215	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3424660)							
EP2014041-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	107	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436145)							
EP2014048-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	88.8	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	112	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	118	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	131	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	105	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	92.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436145)							
EP2014048-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	91.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	88.0	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	89.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	86.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	83.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	87.6	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	91.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	83.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	86.8	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	94.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	82.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436145)							
EP2014048-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	90.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	91.7	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	76.2	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	83.1	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	78.4	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	88.8	65.0	136

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436145) - continued							
EP2014048-002	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	91.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436145)							
EP2014048-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	89.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	97.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	90.6	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	82.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014047**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 9
Order number	: DEF19009/730	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2014047--001	0089_MW228_201215	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2014047--001	0089_MW228_201215	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW228_201215	----	----	----	23-Dec-2020	15-Dec-2020	**8**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	38	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	38	2.63	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW228_201215	**15-Dec-2020**	**----**	----	----	**23-Dec-2020**	15-Dec-2020	×

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW228_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW228_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW228_201215	**15-Dec-2020**	**----**	----	----	**23-Dec-2020**	29-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW228_201215	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW228_201215	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW228_201215	**15-Dec-2020**	**----**	----	----	**17-Dec-2020**	22-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW228_201215	**15-Dec-2020**	**----**	----	----	**16-Dec-2020**	12-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW228_201215, 0089_QC301_201215, 0089_QC401_201215, 0089_QC302_201215, 0089_QC402_201215, 0089_QC303_201215, 0089_QC403_201215, 0089_QC404_201215, 0089_QC304_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW228_201215, 0089_QC301_201215, 0089_QC401_201215, 0089_QC302_201215, 0089_QC402_201215, 0089_QC303_201215, 0089_QC403_201215, 0089_QC404_201215, 0089_QC304_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW228_201215, 0089_QC301_201215, 0089_QC401_201215, 0089_QC302_201215, 0089_QC402_201215, 0089_QC303_201215, 0089_QC403_201215, 0089_QC404_201215, 0089_QC304_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW228_201215, 0089_QC301_201215, 0089_QC401_201215, 0089_QC302_201215, 0089_QC402_201215, 0089_QC303_201215, 0089_QC403_201215, 0089_QC404_201215, 0089_QC304_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW228_201215, 0089_QC301_201215, 0089_QC401_201215, 0089_QC302_201215, 0089_QC402_201215, 0089_QC303_201215, 0089_QC403_201215, 0089_QC404_201215, 0089_QC304_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	14	**14.29**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	14	**14.29**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	14	**7.14**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	38	**2.63**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014047**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17147	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 15-Dec-2020 16:40	Issue Date	: 16-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 10.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 9 / 9

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014047-001	15-Dec-2020 08:31	0089_MW228_201215	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014047-001	15-Dec-2020 08:31	0089_MW228_201215	✓
EP2014047-002	15-Dec-2020 13:48	0089_QC301_201215	✓
EP2014047-003	15-Dec-2020 13:50	0089_QC401_201215	✓
EP2014047-004	15-Dec-2020 13:50	0089_QC302_201215	✓
EP2014047-005	15-Dec-2020 13:50	0089_QC402_201215	✓
EP2014047-006	15-Dec-2020 13:51	0089_QC303_201215	✓
EP2014047-007	15-Dec-2020 13:51	0089_QC403_201215	✓
EP2014047-008	15-Dec-2020 13:52	0089_QC404_201215	✓
EP2014047-009	15-Dec-2020 13:53	0089_QC304_201215	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

COC#: 17147 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	[redacted] BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 15/12/20 1640	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW228		15/12/2020 08:31 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8		X		
002	0089_QC301		15/12/2020 01:48 PM	Water	ALS: 2 Non ALS: 0	No		X			
003	0089_QC401		15/12/2020 01:50 PM	Water	ALS: 2 Non ALS: 0	No		X			
004	0089_QC302		15/12/2020 01:50 PM	Water	ALS: 2 Non ALS: 0	No		X			
005	0089_QC402		15/12/2020 01:50 PM	Water	ALS: 2 Non ALS: 0	No		X			
006	0089_QC303		15/12/2020 01:51 PM	Water	ALS: 2 Non ALS: 0	No		X			
007	0089_QC403		15/12/2020 01:51 PM	Water	ALS: 2 Non ALS: 0	No		X			
008	0089_QC404		15/12/2020 01:52 PM	Water	ALS: 2 Non ALS: 0	No		X			
009	0089_QC304		15/12/2020 01:53 PM	Water	ALS: 2 Non ALS: 0	No		X			

Environmental Division
Perth
Work Order Reference
EP2014047

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 17147 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW228	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 17147 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW228	Clear Plastic Bottle - Natural	250 mL	00070719041868	Green	No	
001	0089_MW228	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049041	Purple	No	
001	0089_MW228	HDPE (no PTFE)	20 mL	00350019170743	Grey	No	
001	0089_MW228	HDPE (no PTFE)	20 mL	00350019170675	Grey	No	
001	0089_MW228	HDPE (no PTFE)	20 mL	00350019170624	Grey	No	
001	0089_MW228	HDPE (no PTFE)	20 mL	00350019170509	Grey	No	
002	0089_QC301	HDPE (no PTFE)	20 mL	00350019170617	Grey	No	
002	0089_QC301	HDPE (no PTFE)	20 mL	00350019170636	Grey	No	
003	0089_QC401	HDPE (no PTFE)	20 mL	00350019170927	Grey	No	
003	0089_QC401	HDPE (no PTFE)	20 mL	00350019170641	Grey	No	
004	0089_QC302	HDPE (no PTFE)	20 mL	00350019170960	Grey	No	
004	0089_QC302	HDPE (no PTFE)	20 mL	00350019170633	Grey	No	
005	0089_QC402	HDPE (no PTFE)	20 mL	00350019170910	Grey	No	
005	0089_QC402	HDPE (no PTFE)	20 mL	00350019170676	Grey	No	
006	0089_QC303	HDPE (no PTFE)	20 mL	00350019170807	Grey	No	
006	0089_QC303	HDPE (no PTFE)	20 mL	00350019170985	Grey	No	
007	0089_QC403	HDPE (no PTFE)	20 mL	00350019170780	Grey	No	
007	0089_QC403	HDPE (no PTFE)	20 mL	00350019170529	Grey	No	
008	0089_QC404	HDPE (no PTFE)	20 mL	00350019170988	Grey	No	
008	0089_QC404	HDPE (no PTFE)	20 mL	00350019171002	Grey	No	
009	0089_QC304	HDPE (no PTFE)	20 mL	00350019170518	Grey	No	
009	0089_QC304	HDPE (no PTFE)	20 mL	00350019170944	Grey	No	

Total Bottle Count: ALS: 22, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014048**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020 16:40
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Dec-2020
C-O-C number	: 17156	Issue Date	: 30-Dec-2020 16:26
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Confirm result OC = 86ppm
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW405_201215	0089_PW306_201215	0089_QC112_201215	0089_PW314_201215	0089_PW315_201215
			Sampling date / time	15-Dec-2020 09:02	15-Dec-2020 10:47	15-Dec-2020 10:49	15-Dec-2020 10:53	15-Dec-2020 10:54
Compound	CAS Number	LOR	Unit	EP2014048-001	EP2014048-003	EP2014048-004	EP2014048-007	EP2014048-008
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.62	7.52	7.57	7.28	7.66
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	37100	42100	41100	41300	42800
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	209	318	134	66	67
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	133	184	134	341	126
Total Alkalinity as CaCO3	----	1	mg/L	133	184	134	341	126
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2910	2910	2840	2800	2910
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20700	20100	20200	20300	20600
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	505	517	494	578	516
Magnesium	7439-95-4	1	mg/L	1580	1520	1540	1630	1590
Sodium	7440-23-5	1	mg/L	12200	11700	11800	12400	12200
Potassium	7440-09-7	1	mg/L	692	677	674	737	718
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	647	631	632	638	644
ø Total Cations	----	0.01	meq/L	704	677	682	721	706
ø Ionic Balance	----	0.01	%	4.18	3.51	3.83	6.14	4.55
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	6	6	4	18	3
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW405_201215	0089_PW306_201215	0089_QC112_201215	0089_PW314_201215	0089_PW315_201215
				Sampling date / time	15-Dec-2020 09:02	15-Dec-2020 10:47	15-Dec-2020 10:49	15-Dec-2020 10:53	15-Dec-2020 10:54
Compound	CAS Number	LOR	Unit		EP2014048-001	EP2014048-003	EP2014048-004	EP2014048-007	EP2014048-008
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.01**	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW405_201215	0089_PW306_201215	0089_QC112_201215	0089_PW314_201215	0089_PW315_201215
				Sampling date / time	15-Dec-2020 09:02	15-Dec-2020 10:47	15-Dec-2020 10:49	15-Dec-2020 10:53	15-Dec-2020 10:54
					EP2014048-001	EP2014048-003	EP2014048-004	EP2014048-007	EP2014048-008
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.01**	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.01**	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.01**	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**106**	**94.2**	**102**	**96.2**	**97.3**
13C8-PFOA	----	0.02	%		**102**	**104**	**97.7**	**98.9**	**103**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW304_201215	0089_SW368_201215	0089_PW367_201215	----	----
			Sampling date / time	15-Dec-2020 12:55	15-Dec-2020 13:08	15-Dec-2020 13:36	----	----
Compound	CAS Number	LOR	Unit	EP2014048-009	EP2014048-011	EP2014048-013	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.64	7.56	7.68	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	28000	36700	40800	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	1460	153	370	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	209	258	174	----	----
Total Alkalinity as CaCO3	----	1	mg/L	209	258	174	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2060	2580	2880	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	14400	17900	20100	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	391	446	503	----	----
Magnesium	7439-95-4	1	mg/L	1090	1340	1580	----	----
Sodium	7440-23-5	1	mg/L	8010	10100	12200	----	----
Potassium	7440-09-7	1	mg/L	451	578	700	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	453	564	630	----	----
ø Total Cations	----	0.01	meq/L	469	587	704	----	----
ø Ionic Balance	----	0.01	%	1.72	1.98	5.49	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	15	8	7	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW304_201215	0089_SW368_201215	0089_PW367_201215	----	----
				Sampling date / time	15-Dec-2020 12:55	15-Dec-2020 13:08	15-Dec-2020 13:36	----	----
Compound	CAS Number	LOR	Unit		EP2014048-009	EP2014048-011	EP2014048-013	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.02**	**0.03**	**0.13**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW304_201215	0089_SW368_201215	0089_PW367_201215	----	----
			Sampling date / time	15-Dec-2020 12:55	15-Dec-2020 13:08	15-Dec-2020 13:36	----	----
Compound	CAS Number	LOR	Unit	EP2014048-009	EP2014048-011	EP2014048-013	--------	--------
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**0.02**	**0.05**	**0.13**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.02**	**0.05**	**0.13**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.02**	**0.05**	**0.13**	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**112**	**114**	**112**	----	----
13C8-PFOA	----	0.02	%	**100**	**102**	**96.8**	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW446_201215	0089_SW309_201215	0089_SW310_201215	0089_SW305_201215	0089_SW371_201215
				Sampling date / time	15-Dec-2020 09:05	15-Dec-2020 10:50	15-Dec-2020 10:51	15-Dec-2020 12:58	15-Dec-2020 13:20
Compound	CAS Number	LOR	Unit		EP2014048-002	EP2014048-005	EP2014048-006	EP2014048-010	EP2014048-012
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.96	7.59	8.00	8.18	8.03
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		41200	41300	41300	41000	40700
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		260	154	64	190	28
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		137	140	119	125	140
Total Alkalinity as CaCO3	----	1	mg/L		137	140	119	125	140
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2820	2860	2870	2780	2770
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19800	20000	20000	19600	19400
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		495	504	496	510	501
Magnesium	7439-95-4	1	mg/L		1520	1560	1550	1580	1540
Sodium	7440-23-5	1	mg/L		11700	12000	11800	12100	11800
Potassium	7440-09-7	1	mg/L		667	693	679	696	677
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		620	626	626	613	608
ø Total Cations	----	0.01	meq/L		676	693	683	700	682
ø Ionic Balance	----	0.01	%		4.30	5.06	4.33	6.58	5.78
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		7	88	8	<1	58
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW446_201215	0089_SW309_201215	0089_SW310_201215	0089_SW305_201215	0089_SW371_201215
				Sampling date / time	15-Dec-2020 09:05	15-Dec-2020 10:50	15-Dec-2020 10:51	15-Dec-2020 12:58	15-Dec-2020 13:20
Compound	CAS Number	LOR	Unit		EP2014048-002	EP2014048-005	EP2014048-006	EP2014048-010	EP2014048-012
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.13**	**0.31**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SW446_201215	0089_SW309_201215	0089_SW310_201215	0089_SW305_201215	0089_SW371_201215
				Sampling date / time	15-Dec-2020 09:05	15-Dec-2020 10:50	15-Dec-2020 10:51	15-Dec-2020 12:58	15-Dec-2020 13:20
					EP2014048-002	EP2014048-005	EP2014048-006	EP2014048-010	EP2014048-012
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	**0.13**	**0.31**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.13**	**0.31**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	**0.13**	**0.31**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**115**	**100**	**110**	**104**	**117**
13C8-PFOA	----	0.02	%		**98.6**	**99.4**	**97.6**	**99.8**	**102**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014048**	Page	: 1 of 10
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Dec-2020
C-O-C number	: 17156	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3440586)									
EP2014048-011	0089_SW368_201215	EA005-P: pH Value	----	0.01	pH Unit	7.56	7.56	0.00	0% - 20%
EP2013998-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.86	7.89	0.381	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3435541)									
EP2014048-009	0089_PW304_201215	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	28000	28200	0.605	0% - 20%
EP2014048-001	0089_PW405_201215	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37100	42500	13.5	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3435562)									
EP2014051-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3910	4130	5.42	0% - 20%
EP2014004-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	428	421	1.65	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3435542)									
EP2014053-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	86	58	39.0	0% - 50%
EP2014048-001	0089_PW405_201215	EA025H: Suspended Solids (SS)	----	5	mg/L	209	194	7.56	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3435564)									
EP2014042-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	184	204	10.1	0% - 20%
EP2014155-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	236	230	2.58	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3440588)									
EP2014048-011	0089_SW368_201215	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	258	258	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	258	258	0.00	0% - 20%
EP2013998-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	233	275	16.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	233	275	16.3	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3424783)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3424783) - continued									
EP2014047-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1510	1530	1.00	0% - 20%
EP2014048-010	0089_SW305_201215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2780	2770	0.423	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3424784)									
EP2014047-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	9600	9570	0.284	0% - 20%
EP2014048-010	0089_SW305_201215	ED045G: Chloride	16887-00-6	1	mg/L	19600	19700	0.745	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426598)									
EP2014047-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	307	305	0.781	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	772	770	0.289	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	5400	5390	0.106	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	296	296	0.00	0% - 20%
EP2014048-010	0089_SW305_201215	ED093F: Calcium	7440-70-2	1	mg/L	510	481	5.80	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1580	1500	5.21	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12100	11500	5.08	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	696	656	5.97	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3430197)									
EP2014048-001	0089_PW405_201215	EP005: Total Organic Carbon	----	1	mg/L	6	6	0.00	No Limit
EP2014048-011	0089_SW368_201215	EP005: Total Organic Carbon	----	1	mg/L	8	9	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3436145)									
EP2014048-001	0089_PW405_201215	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.31	0.26	15.6	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.13	0.13	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.11	0.10	14.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436145)									
EP2014048-001	0089_PW405_201215	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436145) - continued									
EP2014048-001	0089_PW405_201215	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	14.0	15.0	7.07	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	15.0	15.9	6.17	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	3.42	3.22	5.88	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	4.2	3.7	12.8	0% - 20%
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436145)									
EP2014048-001	0089_PW405_201215	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436260) - continued									
EP2014047-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436145)									
EP2014048-001	0089_PW405_201215	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.06	0.06	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3436145)									
EP2014048-001	0089_PW405_201215	EP231X: Sum of PFAS	----	0.01	µg/L	0.01	<0.01	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	37.2	38.4	3.02	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3440586)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3435541)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	97.9	88.1	114
				<10	1000 mg/L	101	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3435562)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3435542)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	112	89.1	120
				<5	1000 mg/L	101	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3435564)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	1000 mg/L	103	89.1	120
				<5	150 mg/L	103	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3440588)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	102	81.2	126
				<1	200 mg/L	98.7	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3424783)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3424784)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.3	87.9	114
				<1	1000 mg/L	97.2	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426598)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.2	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.4	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3430197)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 3430197) - continued								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436145)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	86.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	91.0	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	89.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	88.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	82.8	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436260)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	93.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	83.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	82.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	83.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	81.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436145)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	88.5	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	87.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	86.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	82.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	84.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	86.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	94.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.0	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	83.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	86.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	79.7	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436260)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	93.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	91.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	90.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	86.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	98.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.2	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436260) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	87.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	81.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436145)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	91.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	99.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	85.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	84.1	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	84.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	93.8	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436260)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	101	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	101	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	91.8	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	88.0	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	86.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	103	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436145)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	83.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	93.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	94.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	90.2	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436260)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	89.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	96.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	83.8	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3424783)							
EP2014047-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3424784)							
EP2014047-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3430197)							
EP2014048-002	0089_SW446_201215	EP005: Total Organic Carbon	----	100 mg/L	110	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436145)							
EP2014048-002	0089_SW446_201215	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	88.8	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	112	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	118	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	131	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	105	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	92.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436145)							
EP2014048-002	0089_SW446_201215	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	91.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	88.0	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	89.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	86.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	83.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	87.6	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	91.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	83.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	86.8	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	94.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	82.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436145)							
EP2014048-002	0089_SW446_201215	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	90.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	91.7	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	76.2	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	83.1	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	78.4	57.6	145

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436145) - continued							
EP2014048-002	0089_SW446_201215	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	88.8	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	91.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436145)							
EP2014048-002	0089_SW446_201215	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	89.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	97.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	90.6	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	82.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014048**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 13
Order number	: DEF19009/730	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2014047--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2014047--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_PW405_201215,	0089_SW446_201215,	----	----	----	24-Dec-2020	15-Dec-2020	**9**
0089_PW306_201215,	0089_QC112_201215,						
0089_SW309_201215,	0089_SW310_201215,						
0089_PW314_201215,	0089_PW315_201215,						
0089_PW304_201215,	0089_SW305_201215,						
0089_SW368_201215,	0089_SW371_201215,						
0089_PW367_201215							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	38	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	38	2.63	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**----**	----	----	**24-Dec-2020**	15-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**----**	----	----	**24-Dec-2020**	29-Dec-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**----**	----	----	**17-Dec-2020**	22-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**----**	----	----	**18-Dec-2020**	12-Jan-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW405_201215, 0089_SW446_201215, 0089_PW306_201215, 0089_QC112_201215, 0089_SW309_201215, 0089_SW310_201215, 0089_PW314_201215, 0089_PW315_201215, 0089_PW304_201215, 0089_SW305_201215, 0089_SW368_201215, 0089_SW371_201215, 0089_PW367_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	31	**12.90**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	33	**12.12**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	31	**12.90**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	33	**12.12**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	33	**6.06**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	38	**2.63**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014048**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17156	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 15-Dec-2020 16:40	Issue Date	: 16-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 10.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014048-001	15-Dec-2020 09:02	0089_PW405_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-002	15-Dec-2020 09:05	0089_SW446_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-003	15-Dec-2020 10:47	0089_PW306_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-004	15-Dec-2020 10:49	0089_QC112_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-005	15-Dec-2020 10:50	0089_SW309_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-006	15-Dec-2020 10:51	0089_SW310_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-007	15-Dec-2020 10:53	0089_PW314_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-008	15-Dec-2020 10:54	0089_PW315_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-009	15-Dec-2020 12:55	0089_PW304_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-010	15-Dec-2020 12:58	0089_SW305_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-011	15-Dec-2020 13:08	0089_SW368_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-012	15-Dec-2020 13:20	0089_SW371_201215	✓	✓	✓	✓	✓	✓	✓
EP2014048-013	15-Dec-2020 13:36	0089_PW367_201215	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014048-001	15-Dec-2020 09:02	0089_PW405_201215	✓
EP2014048-002	15-Dec-2020 09:05	0089_SW446_201215	✓
EP2014048-003	15-Dec-2020 10:47	0089_PW306_201215	✓
EP2014048-004	15-Dec-2020 10:49	0089_QC112_201215	✓
EP2014048-005	15-Dec-2020 10:50	0089_SW309_201215	✓
EP2014048-006	15-Dec-2020 10:51	0089_SW310_201215	✓
EP2014048-007	15-Dec-2020 10:53	0089_PW314_201215	✓
EP2014048-008	15-Dec-2020 10:54	0089_PW315_201215	✓
EP2014048-009	15-Dec-2020 12:55	0089_PW304_201215	✓
EP2014048-010	15-Dec-2020 12:58	0089_SW305_201215	✓
EP2014048-011	15-Dec-2020 13:08	0089_SW368_201215	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014048-012	15-Dec-2020 13:20	0089_SW371_201215	✓
EP2014048-013	15-Dec-2020 13:36	0089_PW367_201215	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) — Email [redacted]
- [redacted]
- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ENMRG (ENMRG) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 17156 ALS Laboratory: EP Perth

RELINQUISHED BY:	[redacted] BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 15/12/20 1640	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

~~LABORATORY USE ONLY (Circle)~~

Custody Seal intact?	Yes	No	N/A
Free Ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW405		15/12/2020 09:02 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		
002	0089_SW446		15/12/2020 09:05 AM	Water	ALS: 5 Non ALS: 1	No	Partial 7/8	X		
003	0089_PW306		15/12/2020 10:47 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_QC112		15/12/2020 10:49 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_SW309		15/12/2020 10:50 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_SW310		15/12/2020 10:51 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_PW314		15/12/2020 10:53 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_PW315		15/12/2020 10:54 AM	Water	ALS: 3 Non ALS: 1	No	X	X		
009	0089_PW304		15/12/2020 12:55 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2014048

Telephone : + 61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 17156 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SW305		15/12/2020 12:58 PM	Water	ALS: 3 Non ALS: 1	No	X	X		
011	0089_SW368		15/12/2020 01:08 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
012	0089_SW371		15/12/2020 01:20 PM	Water	ALS: 3 Non ALS: 1	No	X	X		
013	0089_PW367		15/12/2020 01:36 PM	Water	ALS: 4 Non ALS: 0	No	X	X		

CHAIN OF CUSTODY

(ALS) *COC#:* **17156** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW405	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_SW446	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW306	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_QC112	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_SW309	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 17156 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_SW310	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW314	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_PW304	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_SW368	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 17156 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW405	Clear Plastic Bottle - Natural	250 mL	00070719041779	Green	No	
001	0089_PW405	HDPE (no PTFE)	20 mL	00350019170942	Grey	No	
001	0089_PW405	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049190	Purple	No	
001	0089_PW405	HDPE (no PTFE)	20 mL	00350019171040	Grey	No	
001	0089_PW405	HDPE (no PTFE)	20 mL	00350019171022	Grey	No	
001	0089_PW405	HDPE (no PTFE)	20 mL	00350019171050	Grey	No	
002	0089_SW446	Clear Plastic Bottle - Natural	250 mL	00070719041814	Green	No	
002	0089_SW446	HDPE (no PTFE)	20 mL	00350019170550	Grey	No	
002	0089_SW446	HDPE (no PTFE)	20 mL	00350019170970	Grey	No	
002	0089_SW446	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049281	Purple	No	
002	0089_SW446	HDPE (no PTFE)	20 mL	00350019170661	Grey	No	
003	0089_PW306	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049178	Purple	No	
003	0089_PW306	Clear Plastic Bottle - Natural	250 mL	00070719041831	Green	No	
003	0089_PW306	HDPE (no PTFE)	20 mL	00350019171026	Grey	No	
003	0089_PW306	HDPE (no PTFE)	20 mL	00350019170680	Grey	No	
004	0089_QC112	Clear Plastic Bottle - Natural	250 mL	00070719041871	Green	No	
004	0089_QC112	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049323	Purple	No	
004	0089_QC112	HDPE (no PTFE)	20 mL	00350019170994	Grey	No	
004	0089_QC112	HDPE (no PTFE)	20 mL	00350019170973	Grey	No	
005	0089_SW309	Clear Plastic Bottle - Natural	250 mL	00070719041796	Green	No	
005	0089_SW309	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049246	Purple	No	
005	0089_SW309	HDPE (no PTFE)	20 mL	00350019171021	Grey	No	
005	0089_SW309	HDPE (no PTFE)	20 mL	00350019171010	Grey	No	
006	0089_SW310	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049235	Purple	No	
006	0089_SW310	Clear Plastic Bottle - Natural	250 mL	00070719041787	Green	No	
006	0089_SW310	HDPE (no PTFE)	20 mL	00350019170851	Grey	No	

CHAIN OF CUSTODY

COC#: 17156 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free Ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_SW310	HDPE (no PTFE)	20 mL	00350019170506	Grey	No	
007	0089_PW314	Clear Plastic Bottle - Natural	250 mL	00070719041804	Green	No	
007	0089_PW314	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049083	Purple	No	
007	0089_PW314	HDPE (no PTFE)	20 mL	00350019170958	Grey	No	
007	0089_PW314	HDPE (no PTFE)	20 mL	00350019170479	Grey	No	
008	0089_PW315	HDPE (no PTFE)	20 mL	00350019170570	Grey	No	
008	0089_PW315	HDPE (no PTFE)	20 mL	00350019170605	Grey	No	
008	0089_PW315	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049132	Purple	No	
009	0089_PW304	HDPE (no PTFE)	20 mL	00350019170873	Grey	No	
009	0089_PW304	HDPE (no PTFE)	20 mL	00350019170500	Grey	No	
009	0089_PW304	Clear Plastic Bottle - Natural	250 mL	00070719041827	Green	No	
009	0089_PW304	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049231	Purple	No	
010	0089_SW305	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048966	Purple	No	
010	0089_SW305	HDPE (no PTFE)	20 mL	00350019171053	Grey	No	
010	0089_SW305	Clear Plastic Bottle - Natural	250 mL	00070719041679	Green	No	
011	0089_SW368	Clear Plastic Bottle - Natural	250 mL	00070719041719	Green	No	
011	0089_SW368	HDPE (no PTFE)	20 mL	00350019170820	Grey	No	
011	0089_SW368	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049221	Purple	No	
011	0089_SW368	HDPE (no PTFE)	20 mL	00350019170533	Grey	No	
011	0089_SW368	HDPE (no PTFE)	20 mL	00350019170770	Grey	No	
012	0089_SW371	Clear Plastic Bottle - Natural	250 mL	00070719041791	Green	No	
012	0089_SW371	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049141	Purple	No	
012	0089_SW371	HDPE (no PTFE)	20 mL	00350019170656	Grey	No	
013	0089_PW367	Clear Plastic Bottle - Natural	250 mL	00070719041782	Green	No	
013	0089_PW367	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049296	Purple	No	
013	0089_PW367	HDPE (no PTFE)	20 mL	00350019170923	Grey	No	
013	0089_PW367	HDPE (no PTFE)	20 mL	00350019170872	Grey	No	

CHAIN OF CUSTODY

COC#: **17156** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A

Random Sample Temperature on Receipt: °C

Other comments:

Total Bottle Count: ALS: 53, Non ALS: 4

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014049**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020 16:40
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Dec-2020
C-O-C number	: 17158	Issue Date	: 24-Dec-2020 10:25
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD405_201215	0089_SD315_201215	0089_SD306_201215	0089_SD314_201215	0089_SD304_201215
			Sampling date / time	15-Dec-2020 09:08	15-Dec-2020 10:57	15-Dec-2020 10:59	15-Dec-2020 10:59	15-Dec-2020 13:00
Compound	CAS Number	LOR	Unit	EP2014049-001	EP2014049-002	EP2014049-003	EP2014049-004	EP2014049-005
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	8.5	8.8	8.6	8.6	8.6
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	3920	2120	2810	2550	2960
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	30.5	12.8	30.1	18.2	30.0
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	3.2	3.5	2.2	2.6	5.4
Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.5	0.4	0.4	0.8
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.1	0.2	0.2
Cation Exchange Capacity	----	0.1	meq/100g	3.9	4.3	2.7	3.2	6.4
Exchangeable Sodium Percent	----	0.1	%	5.0	4.7	4.9	6.7	2.9
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.6	0.5	1.0	<0.5	1.2
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD405_201215	0089_SD315_201215	0089_SD306_201215	0089_SD314_201215	0089_SD304_201215
				Sampling date / time	15-Dec-2020 09:08	15-Dec-2020 10:57	15-Dec-2020 10:59	15-Dec-2020 10:59	15-Dec-2020 13:00
Compound	CAS Number	LOR	Unit		EP2014049-001	EP2014049-002	EP2014049-003	EP2014049-004	EP2014049-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD405_201215	0089_SD315_201215	0089_SD306_201215	0089_SD314_201215	0089_SD304_201215
				Sampling date / time	15-Dec-2020 09:08	15-Dec-2020 10:57	15-Dec-2020 10:59	15-Dec-2020 10:59	15-Dec-2020 13:00
Compound	CAS Number	LOR	Unit		EP2014049-001	EP2014049-002	EP2014049-003	EP2014049-004	EP2014049-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**112**	**112**	**112**	**106**	**111**
13C8-PFOA	----	0.0002	%		**114**	**110**	**115**	**112**	**111**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD368_201215	0089_SD367_201215	----	----	----
			Sampling date / time	15-Dec-2020 13:13	15-Dec-2020 13:34	----	----	----
Compound	CAS Number	LOR	Unit	EP2014049-006	EP2014049-007	--------	--------	--------
				Result	Result	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**8.7**	**8.7**	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**2710**	**3630**	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**30.5**	**32.4**	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**7.6**	**6.0**	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.9**	**0.9**	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	**0.2**	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**8.8**	**7.2**	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**2.5**	**3.2**	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	**1.0**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	**0.0007**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD368_201215	0089_SD367_201215	----	----	----
				Sampling date / time	15-Dec-2020 13:13	15-Dec-2020 13:34	----	----	----
Compound	CAS Number	LOR	Unit		EP2014049-006	EP2014049-007	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	**0.0007**	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)			Sample ID	**0089_SD368_201215**	**0089_SD367_201215**	**----**	**----**	**----**
			Sampling date / time	15-Dec-2020 13:13	15-Dec-2020 13:34	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EP2014049-006**	**EP2014049-007**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	**0.0007**	**----**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	**0.0007**	**----**	**----**	**----**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**108**	**112**	**----**	**----**	**----**
13C8-PFOA	----	0.0002	%	**104**	**110**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014049**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Dec-2020
C-O-C number	: 17158	Issue Date	: 24-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3426017)									
EP2014049-001	0089_SD405_201215	EA002: pH Value	----	0.1	pH Unit	8.5	8.7	1.98	0% - 20%
EP2014052-003	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.0	9.0	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3426016)									
EP2014049-001	0089_SD405_201215	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3920	4010	2.27	0% - 20%
EP2014052-003	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3080	2980	3.30	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3426009)									
EP2014049-001	0089_SD405_201215	EA055: Moisture Content	----	0.1	%	30.5	29.8	2.05	0% - 20%
EP2014052-003	Anonymous	EA055: Moisture Content	----	0.1	%	24.8	22.0	11.9	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3425984)									
EP2014049-001	0089_SD405_201215	ED008: Exchangeable Sodium Percent	----	0.1	%	5.0	4.8	3.20	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	3.2	3.3	4.18	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.5	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	3.9	4.0	3.24	0% - 20%
EP2014052-003	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	2.9	2.7	6.70	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	5.5	4.5	19.3	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.7	0.6	24.0	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.1	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	6.4	5.2	20.0	0% - 20%
EP004: Organic Matter (QC Lot: 3425986)									
EP2014049-001	0089_SD405_201215	EP004: Organic Matter	----	0.5	%	0.6	0.6	0.00	No Limit
EP2014052-004	Anonymous	EP004: Organic Matter	----	0.5	%	1.0	0.9	13.5	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3433751)									
EP2014049-001	0089_SD405_201215	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP2014052-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3433751)									
EP2014049-001	0089_SD405_201215	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP2014052-004	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3433751)									
EP2014049-001	0089_SD405_201215	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3433751) - continued									
EP2014049-001	0089_SD405_201215	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2014052-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3433751)									
EP2014049-001	0089_SD405_201215	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2014052-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3426017)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3426016)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.9	93.6	106
ED008: Exchangeable Cations (QCLot: 3425984)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	93.1	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	92.4	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	103	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	119	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	93.8	79.9	110
EP004: Organic Matter (QCLot: 3425986)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	108	70.0	120
				<0.5	85 %	87.3	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3433751)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3433751)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	122	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	130	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3433751)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3433751) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	107	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3433751)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	106	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	119	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	113	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3433751)							
EP2014049-001	0089_SD405_201215	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	106	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	118	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	111	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	121	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	114	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	108	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3433751)							
EP2014049-001	0089_SD405_201215	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	114	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	120	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	118	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	121	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	115	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	122	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	115	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3433751) - continued							
EP2014049-001	0089_SD405_201215	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	114	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	106	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	110	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3433751)							
EP2014049-001	0089_SD405_201215	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	113	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	98.9	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	110	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	103	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	102	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	114	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	120	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3433751)							
EP2014049-001	0089_SD405_201215	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	113	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	128	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	124	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	108	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014049**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 7
Order number	: DEF19009/730	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD405_201215, 0089_SD315_201215, 0089_SD306_201215, 0089_SD314_201215, 0089_SD304_201215, 0089_SD368_201215, 0089_SD367_201215	**15-Dec-2020**	**18-Dec-2020**	22-Dec-2020	✓	**18-Dec-2020**	18-Dec-2020	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD405_201215, 0089_SD315_201215, 0089_SD306_201215, 0089_SD314_201215, 0089_SD304_201215, 0089_SD368_201215, 0089_SD367_201215	**15-Dec-2020**	**18-Dec-2020**	22-Dec-2020	✓	**18-Dec-2020**	15-Jan-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD405_201215, 0089_SD315_201215, 0089_SD306_201215, 0089_SD314_201215, 0089_SD304_201215, 0089_SD368_201215, 0089_SD367_201215	**15-Dec-2020**	**----**	----	----	**17-Dec-2020**	29-Dec-2020	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD405_201215, 0089_SD315_201215, 0089_SD306_201215, 0089_SD314_201215, 0089_SD304_201215, 0089_SD368_201215, 0089_SD367_201215	**15-Dec-2020**	**22-Dec-2020**	12-Jan-2021	✓	**22-Dec-2020**	12-Jan-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD405_201215, 0089_SD315_201215, 0089_SD306_201215, 0089_SD314_201215, 0089_SD304_201215, 0089_SD368_201215, 0089_SD367_201215	**15-Dec-2020**	**18-Dec-2020**	12-Jan-2021	✓	**18-Dec-2020**	12-Jan-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD405_201215, 0089_SD315_201215, 0089_SD306_201215, 0089_SD314_201215, 0089_SD304_201215, 0089_SD368_201215, 0089_SD367_201215	**15-Dec-2020**	**21-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD405_201215, 0089_SD315_201215, 0089_SD306_201215, 0089_SD314_201215, 0089_SD304_201215, 0089_SD368_201215, 0089_SD367_201215	**15-Dec-2020**	**21-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD405_201215, 0089_SD315_201215, 0089_SD306_201215, 0089_SD314_201215, 0089_SD304_201215, 0089_SD368_201215, 0089_SD367_201215	**15-Dec-2020**	**21-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD405_201215, 0089_SD315_201215, 0089_SD306_201215, 0089_SD314_201215, 0089_SD304_201215, 0089_SD368_201215, 0089_SD367_201215	**15-Dec-2020**	**21-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD405_201215, 0089_SD315_201215, 0089_SD306_201215, 0089_SD314_201215, 0089_SD304_201215, 0089_SD368_201215, 0089_SD367_201215	**15-Dec-2020**	**21-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
Sample Extraction for PFAS in solid matrices	ORG73	SOIL	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2014049**		
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17158	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 15-Dec-2020 16:40	Issue Date	: 16-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 10.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2014049-001	15-Dec-2020 09:08	0089_SD405_201215	✓	✓	✓	✓
EP2014049-002	15-Dec-2020 10:57	0089_SD315_201215	✓	✓	✓	✓
EP2014049-003	15-Dec-2020 10:59	0089_SD306_201215	✓	✓	✓	✓
EP2014049-004	15-Dec-2020 10:59	0089_SD314_201215	✓	✓	✓	✓
EP2014049-005	15-Dec-2020 13:00	0089_SD304_201215	✓	✓	✓	✓
EP2014049-006	15-Dec-2020 13:13	0089_SD368_201215	✓	✓	✓	✓
EP2014049-007	15-Dec-2020 13:34	0089_SD367_201215	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ENMRG (ENMRG) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 17158 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ab DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	[redacted] BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 15/12/20 1640	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD405		15/12/2020 09:08 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD315		15/12/2020 10:57 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD306		15/12/2020 10:59 AM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD314		15/12/2020 10:59 AM	Soil	ALS: 2 Non ALS: 0	No		X		
005	0089_SD304		15/12/2020 01:00 PM	Soil	ALS: 2 Non ALS: 0	No		X		
006	0089_SD368		15/12/2020 01:13 PM	Soil	ALS: 2 Non ALS: 0	No		X		
007	0089_SD367		15/12/2020 01:34 PM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division
Perth
Work Order Reference
EP2014049

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 17158 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ab DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD405	Soil Glass Jar - Unpreserved	150 mL	00260220067594	Orange	No	
001	0089_SD405	HDPE Soil Jar	200 mL	00620719068413	Grey	No	
002	0089_SD315	HDPE Soil Jar	200 mL	00620719068354	Grey	No	
002	0089_SD315	Soil Glass Jar - Unpreserved	150 mL	00260220067607	Orange	No	
003	0089_SD306	Soil Glass Jar - Unpreserved	150 mL	00260220067424	Orange	No	
003	0089_SD306	HDPE Soil Jar	200 mL	00620719068376	Grey	No	
004	0089_SD314	Soil Glass Jar - Unpreserved	150 mL	00260220067617	Orange	No	
004	0089_SD314	HDPE Soil Jar	200 mL	00620719068372	Grey	No	
005	0089_SD304	Soil Glass Jar - Unpreserved	150 mL	00260220067440	Orange	No	
005	0089_SD304	HDPE Soil Jar	200 mL	00620719068398	Grey	No	
006	0089_SD368	HDPE Soil Jar	200 mL	00620719068387	Grey	No	
006	0089_SD368	Soil Glass Jar - Unpreserved	150 mL	00260220067604	Orange	No	
007	0089_SD367	Soil Glass Jar - Unpreserved	150 mL	00260220067688	Orange	No	
007	0089_SD367	HDPE Soil Jar	200 mL	00620719068296	Grey	No	

Total Bottle Count: ALS: 14, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014051**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020 16:40
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Dec-2020
C-O-C number	: 17151	Issue Date	: 30-Dec-2020 16:22
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW227_201215	0089_MW200_201215	0089_QC115_201215	----	----
			Sampling date / time	15-Dec-2020 08:54	15-Dec-2020 13:27	15-Dec-2020 13:28	----	----
Compound	CAS Number	LOR	Unit	EP2014051-001	EP2014051-002	EP2014051-003	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.93	8.14	8.17	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	2160	3910	3890	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	111	2010	174	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	375	405	409	----	----
Total Alkalinity as CaCO3	----	1	mg/L	375	405	409	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	204	232	225	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	910	2180	2140	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	121	100	99	----	----
Magnesium	7439-95-4	1	mg/L	68	117	114	----	----
Sodium	7440-23-5	1	mg/L	599	1300	1270	----	----
Potassium	7440-09-7	1	mg/L	25	69	69	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	37.4	74.4	73.2	----	----
ø Total Cations	----	0.01	meq/L	38.3	72.9	71.3	----	----
ø Ionic Balance	----	0.01	%	1.21	1.01	1.31	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	14	10	2	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW227_201215	0089_MW200_201215	0089_QC115_201215	----	----
				Sampling date / time	15-Dec-2020 08:54	15-Dec-2020 13:27	15-Dec-2020 13:28	----	----
Compound	CAS Number	LOR	Unit		EP2014051-001	EP2014051-002	EP2014051-003	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW227_201215	0089_MW200_201215	0089_QC115_201215	----	----
				Sampling date / time	15-Dec-2020 08:54	15-Dec-2020 13:27	15-Dec-2020 13:28	----	----
Compound	CAS Number	LOR	Unit		EP2014051-001	EP2014051-002	EP2014051-003	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**120**	**118**	**115**	----	----
13C8-PFOA	----	0.02	%		**98.8**	**99.2**	**101**	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014051**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Dec-2020
C-O-C number	: 17151	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3438206)									
EP2014083-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.14	8.10	0.493	0% - 20%
EP2014093-004	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.53	8.53	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3435562)									
EP2014051-002	0089_MW200_201215	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3910	4130	5.42	0% - 20%
EP2014004-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	428	421	1.65	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3435564)									
EP2014042-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	184	204	10.1	0% - 20%
EP2014155-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	236	230	2.58	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3438205)									
EP2014083-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	206	207	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	206	207	0.00	0% - 20%
EP2014093-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	14	14	0.00	0% - 50%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	153	154	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	168	168	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3424783)									
EP2014047-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1510	1530	1.00	0% - 20%
EP2014048-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2780	2770	0.423	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3424784)									
EP2014047-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	9600	9570	0.284	0% - 20%
EP2014048-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19600	19700	0.745	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426598)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3426598) - continued									
EP2014047-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	307	305	0.781	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	772	770	0.289	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	5400	5390	0.106	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	296	296	0.00	0% - 20%
EP2014048-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	510	481	5.80	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1580	1500	5.21	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12100	11500	5.08	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	696	656	5.97	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3430806)									
EP2014051-001	0089_MW227_201215	EP005: Total Organic Carbon	----	1	mg/L	14	12	13.6	0% - 50%
EP2014053-008	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	13	11	17.5	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.31	0.26	15.6	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.13	0.13	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.11	0.10	14.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	14.0	15.0	7.07	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	15.0	15.9	6.17	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	3.42	3.22	5.88	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	4.2	3.7	12.8	0% - 20%
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436260) - continued									
EP2014047-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.06	0.06	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	37.2	38.4	3.02	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3438206)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3435562)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3435564)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	1000 mg/L	103	89.1	120
				<5	150 mg/L	103	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3438205)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	111	81.2	126
				<1	200 mg/L	98.9	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3424783)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3424784)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.3	87.9	114
				<1	1000 mg/L	97.2	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426598)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.2	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.4	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3430806)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436260)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	93.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	83.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	82.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	83.0	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436260) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	81.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436260)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	93.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	91.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	90.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	86.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	98.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	87.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	81.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436260)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	101	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	101	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	91.8	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	88.0	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	86.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	103	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436260)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	89.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	96.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	83.8	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3424783)							
EP2014047-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3424784)							
EP2014047-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3430806)							
EP2014051-002	0089_MW200_201215	EP005: Total Organic Carbon	----	100 mg/L	102	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014051**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 3
Order number	: DEF19009/730	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2014047--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2014047--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW227_201215, 0089_MW200_201215, 0089_QC115_201215	----	----	----	23-Dec-2020	15-Dec-2020	**8**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW227_201215, 0089_QC115_201215	0089_MW200_201215,	**15-Dec-2020**	**----**	----	----	**23-Dec-2020**	15-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW227_201215, 0089_QC115_201215	0089_MW200_201215,	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW227_201215, 0089_QC115_201215	0089_MW200_201215,	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW227_201215, 0089_QC115_201215	0089_MW200_201215,	**15-Dec-2020**	**----**	----	----	**23-Dec-2020**	29-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW227_201215, 0089_QC115_201215	0089_MW200_201215,	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW227_201215, 0089_QC115_201215	0089_MW200_201215,	**15-Dec-2020**	**----**	----	----	**30-Dec-2020**	12-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW227_201215, 0089_QC115_201215	0089_MW200_201215,	**15-Dec-2020**	**----**	----	----	**17-Dec-2020**	22-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW227_201215, 0089_QC115_201215	0089_MW200_201215,	**15-Dec-2020**	**----**	----	----	**18-Dec-2020**	12-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW227_201215, 0089_QC115_201215	0089_MW200_201215,	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW227_201215, 0089_QC115_201215	0089_MW200_201215,	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW227_201215, 0089_MW200_201215, 0089_QC115_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW227_201215, 0089_MW200_201215, 0089_QC115_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW227_201215, 0089_MW200_201215, 0089_QC115_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	14	**14.29**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	14	**14.29**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	14	**7.14**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014051**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17151	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 15-Dec-2020 16:40	Issue Date	: 16-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 10.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014051-001	15-Dec-2020 08:54	0089_MW227_201215	✓	✓	✓	✓	✓	✓	✓
EP2014051-002	15-Dec-2020 13:27	0089_MW200_201215	✓	✓	✓	✓	✓	✓	✓
EP2014051-003	15-Dec-2020 13:28	0089_QC115_201215	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014051-001	15-Dec-2020 08:54	0089_MW227_201215	✓
EP2014051-002	15-Dec-2020 13:27	0089_MW200_201215	✓
EP2014051-003	15-Dec-2020 13:28	0089_QC115_201215	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ENMRG (ENMRG) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 17151 ALS Laboratory: EP Perth

RELINQUISHED BY:	[redacted]	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 15/12/20 1640	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling GW

ORDER NO: DEF19009/730

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW227		15/12/2020 08:54 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW200		15/12/2020 01:27 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_QC115		15/12/2020 01:28 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division Perth

Work Order Reference

EP2014051

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 17151 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW227	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW200	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_QC115	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: 17151 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW227	Clear Plastic Bottle - Natural	250 mL	00070719041816	Green	No	
001	0089_MW227	HDPE (no PTFE)	20 mL	00350019170720	Grey	No	
001	0089_MW227	HDPE (no PTFE)	20 mL	00350019170559	Grey	No	
001	0089_MW227	Amber TOC Vial - Sulfuric Acid	40 mL	00180220022011	Purple	No	
002	0089_MW200	Clear Plastic Bottle - Natural	250 mL	00070719041747	Green	No	
002	0089_MW200	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049238	Purple	No	
002	0089_MW200	HDPE (no PTFE)	20 mL	00350019170778	Grey	No	
002	0089_MW200	HDPE (no PTFE)	20 mL	00350019170792	Grey	No	
003	0089_QC115	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049242	Purple	No	
003	0089_QC115	Clear Plastic Bottle - Natural	250 mL	00070719041798	Green	No	
003	0089_QC115	HDPE (no PTFE)	20 mL	00350019170803	Grey	No	
003	0089_QC115	HDPE (no PTFE)	20 mL	00350019170579	Grey	No	

Total Bottle Count: ALS: 12, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014052**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020 16:40
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Dec-2020
C-O-C number	: 17159	Issue Date	: 24-Dec-2020 10:24
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD407_201215	0089_SD308_0.50_201215	0089_SD316_201215	0089_SD307_201215	0089_SD369_201215
				Sampling date / time	15-Dec-2020 09:09	15-Dec-2020 10:13	15-Dec-2020 10:37	15-Dec-2020 10:51	15-Dec-2020 13:07
					EP2014052-001	EP2014052-002	EP2014052-003	EP2014052-004	EP2014052-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**8.7**	**9.2**	**9.0**	**9.0**	**8.7**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**3930**	**2190**	**3080**	**2650**	**4510**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**29.5**	**15.9**	**24.8**	**20.2**	**33.6**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**3.2**	**2.4**	**5.5**	**2.4**	**4.1**
Exchangeable Magnesium	----	0.1	meq/100g		**0.5**	**0.3**	**0.7**	**0.4**	**0.6**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		**0.2**	**0.2**	**0.2**	**0.2**	**0.2**
Cation Exchange Capacity	----	0.1	meq/100g		**3.9**	**3.0**	**6.4**	**3.1**	**4.9**
Exchangeable Sodium Percent	----	0.1	%		**4.0**	**8.2**	**2.9**	**8.0**	**4.0**
EP004: Organic Matter									
Organic Matter	----	0.5	%		**0.5**	**0.8**	**0.8**	**1.0**	**0.6**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD407_201215	0089_SD308_0.50_201215	0089_SD316_201215	0089_SD307_201215	0089_SD369_201215
				Sampling date / time	15-Dec-2020 09:09	15-Dec-2020 10:13	15-Dec-2020 10:37	15-Dec-2020 10:51	15-Dec-2020 13:07
Compound	CAS Number	LOR	Unit		EP2014052-001	EP2014052-002	EP2014052-003	EP2014052-004	EP2014052-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD407_201215	0089_SD308_0.50_201215	0089_SD316_201215	0089_SD307_201215	0089_SD369_201215
				Sampling date / time	15-Dec-2020 09:09	15-Dec-2020 10:13	15-Dec-2020 10:37	15-Dec-2020 10:51	15-Dec-2020 13:07
Compound	CAS Number	LOR	Unit		EP2014052-001	EP2014052-002	EP2014052-003	EP2014052-004	EP2014052-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**112**	**108**	**112**	**112**	**113**
13C8-PFOA	----	0.0002	%		**112**	**114**	**108**	**112**	**111**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD345_201215	----	----	----	----
			Sampling date / time	15-Dec-2020 13:43	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2014052-006	--------	--------	--------	--------
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**8.3**	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**5820**	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**35.4**	----	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**4.3**	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.6**	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**5.1**	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**4.1**	----	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	**0.6**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD345_201215	----	----	----	----
				Sampling date / time	15-Dec-2020 13:43	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2014052-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)				Sample ID	**0089_SD345_201215**	**----**	**----**	**----**	**----**
				Sampling date / time	15-Dec-2020 13:43	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2014052-006**	**--------**	**--------**	**--------**	**--------**
					Result	----	----	----	----
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	**----**	**----**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	**----**	**----**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**106**	**----**	**----**	**----**	**----**
13C8-PFOA	----	0.0002	%		**114**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014052**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Dec-2020
C-O-C number	: 17159	Issue Date	: 24-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3426017)									
EP2014049-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.5	8.7	1.98	0% - 20%
EP2014052-003	0089_SD316_201215	EA002: pH Value	----	0.1	pH Unit	9.0	9.0	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3426016)									
EP2014049-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3920	4010	2.27	0% - 20%
EP2014052-003	0089_SD316_201215	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3080	2980	3.30	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3426009)									
EP2014049-001	Anonymous	EA055: Moisture Content	----	0.1	%	30.5	29.8	2.05	0% - 20%
EP2014052-003	0089_SD316_201215	EA055: Moisture Content	----	0.1	%	24.8	22.0	11.9	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3425984)									
EP2014049-001	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	5.0	4.8	3.20	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	3.2	3.3	4.18	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.5	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	3.9	4.0	3.24	0% - 20%
EP2014052-003	0089_SD316_201215	ED008: Exchangeable Sodium Percent	----	0.1	%	2.9	2.7	6.70	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	5.5	4.5	19.3	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.7	0.6	24.0	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.1	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	6.4	5.2	20.0	0% - 20%
EP004: Organic Matter (QC Lot: 3425986)									
EP2014049-001	Anonymous	EP004: Organic Matter	----	0.5	%	0.6	0.6	0.00	No Limit
EP2014052-004	0089_SD307_201215	EP004: Organic Matter	----	0.5	%	1.0	0.9	13.5	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3433751)									
EP2014049-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP2014052-004	0089_SD307_201215	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3433751)									
EP2014049-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP2014052-004	0089_SD307_201215	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3433751)									
EP2014049-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3433751) - continued									
EP2014049-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2014052-004	0089_SD307_201215	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3433751)									
EP2014049-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2014052-004	0089_SD307_201215	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3426017)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3426016)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.9	93.6	106
ED008: Exchangeable Cations (QCLot: 3425984)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	93.1	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	92.4	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	103	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	119	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	93.8	79.9	110
EP004: Organic Matter (QCLot: 3425986)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	108	70.0	120
				<0.5	85 %	87.3	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3433751)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3433751)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	122	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	130	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3433751)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3433751) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	107	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3433751)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	106	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	119	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	113	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3433751)							
EP2014049-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	106	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	118	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	111	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	121	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	114	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	108	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3433751)							
EP2014049-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	114	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	120	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	118	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	121	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	115	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	122	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	115	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3433751) - continued							
EP2014049-001	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	114	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	106	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	110	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3433751)							
EP2014049-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	113	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	98.9	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	110	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	103	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	102	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	114	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	120	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3433751)							
EP2014049-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	113	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	128	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	124	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	108	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014052**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 6
Order number	: DEF19009/730	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD407_201215, 0089_SD316_201215, 0089_SD369_201215, 0089_SD308_0.50_201215, 0089_SD307_201215, 0089_SD345_201215	**15-Dec-2020**	**18-Dec-2020**	22-Dec-2020	✓	**18-Dec-2020**	18-Dec-2020	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD407_201215, 0089_SD316_201215, 0089_SD369_201215, 0089_SD308_0.50_201215, 0089_SD307_201215, 0089_SD345_201215	**15-Dec-2020**	**18-Dec-2020**	22-Dec-2020	✓	**18-Dec-2020**	15-Jan-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD407_201215, 0089_SD316_201215, 0089_SD369_201215, 0089_SD308_0.50_201215, 0089_SD307_201215, 0089_SD345_201215	**15-Dec-2020**	**----**	----	----	**17-Dec-2020**	29-Dec-2020	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD407_201215, 0089_SD316_201215, 0089_SD369_201215, 0089_SD308_0.50_201215, 0089_SD307_201215, 0089_SD345_201215	**15-Dec-2020**	**22-Dec-2020**	12-Jan-2021	✓	**22-Dec-2020**	12-Jan-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD407_201215, 0089_SD316_201215, 0089_SD369_201215, 0089_SD308_0.50_201215, 0089_SD307_201215, 0089_SD345_201215	**15-Dec-2020**	**18-Dec-2020**	12-Jan-2021	✓	**18-Dec-2020**	12-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD407_201215, 0089_SD316_201215, 0089_SD369_201215, 0089_SD308_0.50_201215, 0089_SD307_201215, 0089_SD345_201215	**15-Dec-2020**	**21-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD407_201215, 0089_SD308_0.50_201215, 0089_SD316_201215, 0089_SD307_201215, 0089_SD369_201215, 0089_SD345_201215	**15-Dec-2020**	**21-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD407_201215, 0089_SD308_0.50_201215, 0089_SD316_201215, 0089_SD307_201215, 0089_SD369_201215, 0089_SD345_201215	**15-Dec-2020**	**21-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD407_201215, 0089_SD308_0.50_201215, 0089_SD316_201215, 0089_SD307_201215, 0089_SD369_201215, 0089_SD345_201215	**15-Dec-2020**	**21-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD407_201215, 0089_SD308_0.50_201215, 0089_SD316_201215, 0089_SD307_201215, 0089_SD369_201215, 0089_SD345_201215	**15-Dec-2020**	**21-Dec-2020**	13-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
Sample Extraction for PFAS in solid matrices	ORG73	SOIL	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014052**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17159	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 15-Dec-2020 16:40	Issue Date	: 16-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 10.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 6 / 6

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2014052-002 : 15-Dec-2020 10:13 : 0089_SD308_0.50_201215

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2014052-001	15-Dec-2020 09:09	0089_SD407_201215	✓	✓	✓	✓
EP2014052-002	15-Dec-2020 10:13	0089_SD308_0.50_2012...	✓	✓	✓	✓
EP2014052-003	15-Dec-2020 10:37	0089_SD316_201215	✓	✓	✓	✓
EP2014052-004	15-Dec-2020 10:51	0089_SD307_201215	✓	✓	✓	✓
EP2014052-005	15-Dec-2020 13:07	0089_SD369_201215	✓	✓	✓	✓
EP2014052-006	15-Dec-2020 13:43	0089_SD345_201215	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ENMRG (ENMRG) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 17159 ALS Laboratory: EP Perth

RELINQUISHED BY:	[redacted] BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 15/12/20 1640	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD407		15/12/2020 09:09 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD308_0.50		15/12/2020 10:13 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD316		15/12/2020 10:37 AM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD307		15/12/2020 10:51 AM	Soil	ALS: 2 Non ALS: 0	No		X		
005	0089_SD369		15/12/2020 01:07 PM	Soil	ALS: 2 Non ALS: 0	No		X		
006	0089_SD345		15/12/2020 01:43 PM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division Perth

Work Order Reference

EP2014052

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: **17159** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD407	HDPE Soil Jar	200 mL	00620719068409	Grey	No	
001	0089_SD407	Soil Glass Jar - Unpreserved	150 mL	00260220067578	Orange	No	
002	0089_SD308_0.50	Soil Glass Jar - Unpreserved	150 mL	00260220067788	Orange	No	
002	0089_SD308_0.50	HDPE Soil Jar	200 mL	00620719068379	Grey	No	
003	0089_SD316	HDPE Soil Jar	200 mL	00620719068343	Grey	No	
003	0089_SD316	Soil Glass Jar - Unpreserved	150 mL	00260220067427	Orange	No	
004	0089_SD307	Soil Glass Jar - Unpreserved	150 mL	00260220067585	Orange	No	
004	0089_SD307	HDPE Soil Jar	200 mL	00620719068439	Grey	No	
005	0089_SD369	Soil Glass Jar - Unpreserved	150 mL	00260220067608	Orange	No	
005	0089_SD369	HDPE Soil Jar	200 mL	00620719068418	Grey	No	
006	0089_SD345	Soil Glass Jar - Unpreserved	150 mL	00260220067616	Orange	No	
006	0089_SD345	HDPE Soil Jar	200 mL	00620719068400	Grey	No	

Total Bottle Count: ALS: 12, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014053**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020 16:40
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Dec-2020
C-O-C number	: 7359	Issue Date	: 30-Dec-2020 16:23
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 9		
No. of samples analysed	: 9		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW407_201215	0089_PW308_201215	0089_PW316_201215	0089_PW307_201215	0089_PW369_201215
			Sampling date / time	15-Dec-2020 09:10	15-Dec-2020 10:12	15-Dec-2020 10:36	15-Dec-2020 10:52	15-Dec-2020 13:08
Compound	CAS Number	LOR	Unit	EP2014053-002	EP2014053-003	EP2014053-005	EP2014053-006	EP2014053-007
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.69	7.88	7.87	7.81	7.59
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	44000	44000	43000	43500	43900
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	240	185	1730	240	2320
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	136	117	144	123	189
Total Alkalinity as CaCO3	----	1	mg/L	136	117	144	123	189
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3130	3070	3050	3030	3020
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20200	19400	20200	19900	19800
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	516	507	527	525	528
Magnesium	7439-95-4	1	mg/L	1600	1580	1630	1630	1590
Sodium	7440-23-5	1	mg/L	12300	12200	12500	12500	12100
Potassium	7440-09-7	1	mg/L	700	684	725	710	698
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	638	614	636	627	625
ø Total Cations	----	0.01	meq/L	710	703	723	722	701
ø Ionic Balance	----	0.01	%	5.39	6.83	6.37	7.07	5.74
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	7	6	13	2	6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	0.09
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW407_201215	0089_PW308_201215	0089_PW316_201215	0089_PW307_201215	0089_PW369_201215
				Sampling date / time	15-Dec-2020 09:10	15-Dec-2020 10:12	15-Dec-2020 10:36	15-Dec-2020 10:52	15-Dec-2020 13:08
Compound	CAS Number	LOR	Unit		EP2014053-002	EP2014053-003	EP2014053-005	EP2014053-006	EP2014053-007
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**0.10**	<0.01	**0.60**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.05**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.02**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.08**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW407_201215	0089_PW308_201215	0089_PW316_201215	0089_PW307_201215	0089_PW369_201215
				Sampling date / time	15-Dec-2020 09:10	15-Dec-2020 10:12	15-Dec-2020 10:36	15-Dec-2020 10:52	15-Dec-2020 13:08
					EP2014053-002	EP2014053-003	EP2014053-005	EP2014053-006	EP2014053-007
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**0.05**
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.10**	<0.01	**0.89**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.10**	<0.01	**0.69**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.10**	<0.01	**0.89**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**115**	**114**	**113**	**119**	**119**
13C8-PFOA	----	0.02	%		**94.4**	**98.8**	**98.8**	**98.4**	**98.7**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW345_201215	----	----	----	----
				Sampling date / time	15-Dec-2020 13:42	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2014053-008	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.40	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		53600	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		2950	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		425	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		425	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3660	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		23600	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		721	----	----	----	----
Magnesium	7439-95-4	1	mg/L		2000	----	----	----	----
Sodium	7440-23-5	1	mg/L		15600	----	----	----	----
Potassium	7440-09-7	1	mg/L		948	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		750	----	----	----	----
ø Total Cations	----	0.01	meq/L		903	----	----	----	----
ø Ionic Balance	----	0.01	%		9.25	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		13	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW345_201215	----	----	----	----
				Sampling date / time	15-Dec-2020 13:42	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2014053-008	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.03**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW345_201215	----	----	----	----
				Sampling date / time	15-Dec-2020 13:42	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2014053-008	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.03**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.03**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.03**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**118**	----	----	----	----
13C8-PFOA	----	0.02	%		**98.9**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW408_201215	0089_SW311_201215	0089_SW370_201215	----	----
			Sampling date / time	15-Dec-2020 08:37	15-Dec-2020 10:23	15-Dec-2020 13:52	----	----
Compound	CAS Number	LOR	Unit	EP2014053-001	EP2014053-004	EP2014053-009	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.91	8.09	7.97	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	40400	42300	43400	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	86	170	140	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	142	119	147	----	----
Total Alkalinity as CaCO3	----	1	mg/L	142	119	147	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2990	3040	2990	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	19300	20100	19800	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	488	508	544	----	----
Magnesium	7439-95-4	1	mg/L	1500	1590	1670	----	----
Sodium	7440-23-5	1	mg/L	11400	12200	12900	----	----
Potassium	7440-09-7	1	mg/L	657	687	726	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	610	633	624	----	----
ø Total Cations	----	0.01	meq/L	660	704	744	----	----
ø Ionic Balance	----	0.01	%	4.01	5.37	8.81	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	5	3	5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW408_201215	0089_SW311_201215	0089_SW370_201215	----	----
				Sampling date / time	15-Dec-2020 08:37	15-Dec-2020 10:23	15-Dec-2020 13:52	----	----
Compound	CAS Number	LOR	Unit		EP2014053-001	EP2014053-004	EP2014053-009	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**0.05**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW408_201215	0089_SW311_201215	0089_SW370_201215	----	----
				Sampling date / time	15-Dec-2020 08:37	15-Dec-2020 10:23	15-Dec-2020 13:52	----	----
Compound	CAS Number	LOR	Unit		EP2014053-001	EP2014053-004	EP2014053-009	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.05**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.05**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.05**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**114**	**114**	**118**	----	----
13C8-PFOA	----	0.02	%		**103**	**97.6**	**97.2**	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014053**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Dec-2020
C-O-C number	: 7359	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 9		
No. of samples analysed	: 9		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 3440586)									
EP2014048-011	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.56	7.56	0.00	0% - 20%
EP2013998-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.86	7.89	0.381	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3440590)									
EP2014053-007	0089_PW369_201215	EA005-P: pH Value	----	0.01	pH Unit	7.59	7.65	0.787	0% - 20%
EP2014212-010	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	4.99	5.03	0.798	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3435541)									
EP2014048-009	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	28000	28200	0.605	0% - 20%
EP2014048-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37100	42500	13.5	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3435542)									
EP2014053-001	0089_SW408_201215	EA025H: Suspended Solids (SS)	----	5	mg/L	86	58	39.0	0% - 50%
EP2014048-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	209	194	7.56	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3440588)									
EP2014048-011	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	258	258	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	258	258	0.00	0% - 20%
EP2013998-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	233	275	16.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	233	275	16.3	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3440589)									
EP2014053-007	0089_PW369_201215	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	189	189	0.00	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3440589) - continued									
EP2014053-007	0089_PW369_201215	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	189	189	0.00	0% - 20%
EP2014212-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3434240)									
EP2014053-001	0089_SW408_201215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2990	2990	0.204	0% - 20%
EP2014298-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3640	3620	0.601	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3434241)									
EP2014053-001	0089_SW408_201215	ED045G: Chloride	16887-00-6	1	mg/L	19300	19200	0.737	0% - 20%
EP2014298-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	82600	82600	0.0402	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426598)									
EP2014047-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	307	305	0.781	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	772	770	0.289	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	5400	5390	0.106	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	296	296	0.00	0% - 20%
EP2014048-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	510	481	5.80	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1580	1500	5.21	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12100	11500	5.08	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	696	656	5.97	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3426599)									
EP2014053-004	0089_SW311_201215	ED093F: Calcium	7440-70-2	1	mg/L	508	508	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1590	1570	0.842	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12200	12100	0.493	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	687	688	0.00	0% - 20%
EP2014112-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	8	8	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3430806)									
EP2014051-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	14	12	13.6	0% - 50%
EP2014053-008	0089_PW345_201215	EP005: Total Organic Carbon	----	1	mg/L	13	11	17.5	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.31	0.26	15.6	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.13	0.13	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.11	0.10	14.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	14.0	15.0	7.07	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	15.0	15.9	6.17	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	3.42	3.22	5.88	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	4.2	3.7	12.8	0% - 20%
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.06	0.06	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	37.2	38.4	3.02	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3440586)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3440590)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.5	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3435541)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	97.9	88.1	114
				<10	1000 mg/L	101	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3435542)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	112	89.1	120
				<5	1000 mg/L	101	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3440588)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	102	81.2	126
				<1	200 mg/L	98.7	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3440589)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	108	81.2	126
				<1	200 mg/L	99.3	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3434240)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3434241)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	105	87.9	114
				<1	1000 mg/L	99.2	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3426598)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.8	88.0	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3426598) - continued								
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.2	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.4	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3426599)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	104	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.5	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.3	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.3	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3430806)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436260)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	93.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	83.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	82.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	83.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	81.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436260)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	93.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	91.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	90.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	86.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	98.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	87.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	81.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436260)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	101	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	101	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	91.8	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	88.0	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	86.6	57.6	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436260) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	103	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436260)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	89.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	96.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	83.8	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3434240)							
EP2014053-001	0089_SW408_201215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3434241)							
EP2014053-001	0089_SW408_201215	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3430806)							
EP2014051-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	102	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014053**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 9
Order number	: DEF19009/730	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2014053--001	0089_SW408_201215	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2014053--001	0089_SW408_201215	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_SW408_201215,	0089_PW407_201215,	----	----	----	24-Dec-2020	15-Dec-2020	**9**
0089_PW308_201215,	0089_SW311_201215,						
0089_PW316_201215,	0089_PW307_201215,						
0089_PW369_201215,	0089_PW345_201215,						
0089_SW370_201215							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**----**	----	----	**24-Dec-2020**	15-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	22-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**----**	----	----	**24-Dec-2020**	29-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	12-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**----**	----	----	**22-Dec-2020**	12-Jan-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**----**	----	----	**17-Dec-2020**	22-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**----**	----	----	**18-Dec-2020**	12-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW408_201215, 0089_PW407_201215, 0089_PW308_201215, 0089_SW311_201215, 0089_PW316_201215, 0089_PW307_201215, 0089_PW369_201215, 0089_PW345_201215, 0089_SW370_201215	**15-Dec-2020**	**23-Dec-2020**	13-Jun-2021	✓	**23-Dec-2020**	13-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	30	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014053**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 7359	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 15-Dec-2020 16:40	Issue Date	: 16-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 10.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 9 / 9

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014053-001	15-Dec-2020 08:37	0089_SW408_201215	✓	✓	✓	✓	✓	✓	✓
EP2014053-002	15-Dec-2020 09:10	0089_PW407_201215	✓	✓	✓	✓	✓	✓	✓
EP2014053-003	15-Dec-2020 10:12	0089_PW308_201215	✓	✓	✓	✓	✓	✓	✓
EP2014053-004	15-Dec-2020 10:23	0089_SW311_201215	✓	✓	✓	✓	✓	✓	✓
EP2014053-005	15-Dec-2020 10:36	0089_PW316_201215	✓	✓	✓	✓	✓	✓	✓
EP2014053-006	15-Dec-2020 10:52	0089_PW307_201215	✓	✓	✓	✓	✓	✓	✓
EP2014053-007	15-Dec-2020 13:08	0089_PW369_201215	✓	✓	✓	✓	✓	✓	✓
EP2014053-008	15-Dec-2020 13:42	0089_PW345_201215	✓	✓	✓	✓	✓	✓	✓
EP2014053-009	15-Dec-2020 13:52	0089_SW370_201215	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014053-001	15-Dec-2020 08:37	0089_SW408_201215	✓
EP2014053-002	15-Dec-2020 09:10	0089_PW407_201215	✓
EP2014053-003	15-Dec-2020 10:12	0089_PW308_201215	✓
EP2014053-004	15-Dec-2020 10:23	0089_SW311_201215	✓
EP2014053-005	15-Dec-2020 10:36	0089_PW316_201215	✓
EP2014053-006	15-Dec-2020 10:52	0089_PW307_201215	✓
EP2014053-007	15-Dec-2020 13:08	0089_PW369_201215	✓
EP2014053-008	15-Dec-2020 13:42	0089_PW345_201215	✓
EP2014053-009	15-Dec-2020 13:52	0089_SW370_201215	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

ALS COC#: 7359 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 15/12/20 1640	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW408		15/12/2020 08:37 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW407		15/12/2020 09:10 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_PW308		15/12/2020 10:12 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_SW311		15/12/2020 10:23 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_PW316		15/12/2020 10:36 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_PW307		15/12/2020 10:52 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_PW369		15/12/2020 01:08 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_PW345		15/12/2020 01:42 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_SW370		15/12/2020 01:52 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2014053

Telephone : 61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 7359 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW408	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW407	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW308	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW311	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_PW316	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 7359 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW307	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW369	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_PW345	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_SW370	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 7359 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW408	Clear Plastic Bottle - Natural	250 mL	00070719041764	Green	No	
001	0089_SW408	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049057	Purple	No	
001	0089_SW408	HDPE (no PTFE)	20 mL	00350019170464	Grey	No	
001	0089_SW408	HDPE (no PTFE)	20 mL	00350019171048	Grey	No	
002	0089_PW407	Clear Plastic Bottle - Natural	250 mL	00070719041851	Green	No	
002	0089_PW407	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049301	Purple	No	
002	0089_PW407	HDPE (no PTFE)	20 mL	00350019170753	Grey	No	
002	0089_PW407	HDPE (no PTFE)	20 mL	00350019170854	Grey	No	
003	0089_PW308	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049080	Purple	No	
003	0089_PW308	Clear Plastic Bottle - Natural	250 mL	00070719041820	Green	No	
003	0089_PW308	HDPE (no PTFE)	20 mL	00350019170818	Grey	No	
003	0089_PW308	HDPE (no PTFE)	20 mL	00350019170832	Grey	No	
004	0089_SW311	Clear Plastic Bottle - Natural	250 mL	00070719041733	Green	No	
004	0089_SW311	HDPE (no PTFE)	20 mL	00350019170893	Grey	No	
004	0089_SW311	HDPE (no PTFE)	20 mL	00350019170528	Grey	No	
004	0089_SW311	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048878	Purple	No	
005	0089_PW316	Clear Plastic Bottle - Natural	250 mL	00070719041797	Green	No	
005	0089_PW316	HDPE (no PTFE)	20 mL	00350019170974	Grey	No	
005	0089_PW316	HDPE (no PTFE)	20 mL	00350019171055	Grey	No	
005	0089_PW316	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049207	Purple	No	
006	0089_PW307	Clear Plastic Bottle - Natural	250 mL	00070719041751	Green	No	
006	0089_PW307	HDPE (no PTFE)	20 mL	00350019170622	Grey	No	
006	0089_PW307	HDPE (no PTFE)	20 mL	00350019170542	Grey	No	
006	0089_PW307	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049064	Purple	No	
007	0089_PW369	Clear Plastic Bottle - Natural	250 mL	00070719041724	Green	No	
007	0089_PW369	HDPE (no PTFE)	20 mL	00350019170984	Grey	No	

CHAIN OF CUSTODY

(ALS) *COC#:* **7359** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_PW369	HDPE (no PTFE)	20 mL	00350019171041	Grey	No	
007	0089_PW369	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049058	Purple	No	
008	0089_PW345	Clear Plastic Bottle - Natural	250 mL	00070719041743	Green	No	
008	0089_PW345	HDPE (no PTFE)	20 mL	00350019170918	Grey	No	
008	0089_PW345	HDPE (no PTFE)	20 mL	00350019170842	Grey	No	
008	0089_PW345	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049037	Purple	No	
009	0089_SW370	Clear Plastic Bottle - Natural	250 mL	00070719041815	Green	No	
009	0089_SW370	HDPE (no PTFE)	20 mL	00350019170848	Grey	No	
009	0089_SW370	HDPE (no PTFE)	20 mL	00350019170526	Grey	No	
009	0089_SW370	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049181	Purple	No	

Total Bottle Count: ALS: 36, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014087**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020 14:35
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17191	Issue Date	: 30-Dec-2020 17:10
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW
[redacted]	Instrument Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- TDS by method EA-015 may bias high for sample #9 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW196_201216	0089_QC116_201216	0089_MW193_201216	0089_195S_201216	0089_195D_201216
				Sampling date / time	16-Dec-2020 08:34	16-Dec-2020 08:34	16-Dec-2020 09:24	16-Dec-2020 09:44	16-Dec-2020 09:45
Compound	CAS Number	LOR	Unit		EP2014087-001	EP2014087-002	EP2014087-003	EP2014087-004	EP2014087-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.13	8.06	7.65	7.87	7.66
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		410	418	2000	3060	24200
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		238	668	274	49	1090
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		261	229	484	575	193
Total Alkalinity as CaCO3	----	1	mg/L		261	229	484	575	193
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		25	22	218	356	1660
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		33	32	692	1140	11500
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		81	77	158	181	448
Magnesium	7439-95-4	1	mg/L		21	22	95	157	949
Sodium	7440-23-5	1	mg/L		26	26	389	655	6600
Potassium	7440-09-7	1	mg/L		2	2	31	54	349
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		6.67	5.94	33.7	51.0	363
ø Total Cations	----	0.01	meq/L		6.95	6.84	33.4	51.8	396
ø Ionic Balance	----	0.01	%		2.10	7.04	0.47	0.74	4.43
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		8	5	22	20	2
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	0.76	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	0.58	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	6.87	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	0.28	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW196_201216	0089_QC116_201216	0089_MW193_201216	0089_195S_201216	0089_195D_201216
				Sampling date / time	16-Dec-2020 08:34	16-Dec-2020 08:34	16-Dec-2020 09:24	16-Dec-2020 09:44	16-Dec-2020 09:45
Compound	CAS Number	LOR	Unit		EP2014087-001	EP2014087-002	EP2014087-003	EP2014087-004	EP2014087-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**1.56**	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	**0.2**	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	**0.27**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**1.43**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**0.12**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.33**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW196_201216	0089_QC116_201216	0089_MW193_201216	0089_195S_201216	0089_195D_201216
				Sampling date / time	16-Dec-2020 08:34	16-Dec-2020 08:34	16-Dec-2020 09:24	16-Dec-2020 09:44	16-Dec-2020 09:45
					EP2014087-001	EP2014087-002	EP2014087-003	EP2014087-004	EP2014087-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**12.4**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**8.43**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**11.5**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**114**	**114**	**118**	**118**	**112**
13C8-PFOA	----	0.02	%		**102**	**99.4**	**98.6**	**99.7**	**95.0**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW199_201216	0089_MW203_201216	0089_MW202_201216	0089_MW516_201216	0089_MW261_201216
			Sampling date / time	16-Dec-2020 10:12	16-Dec-2020 10:27	16-Dec-2020 10:46	16-Dec-2020 11:08	16-Dec-2020 11:39
Compound	CAS Number	LOR	Unit	EP2014087-006	EP2014087-007	EP2014087-008	EP2014087-009	EP2014087-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.98	8.00	8.01	7.69	7.91
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	2080	533	738	894	1670
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	154	52	133	1500	98
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	368	296	349	542	416
Total Alkalinity as CaCO3	----	1	mg/L	368	296	349	542	416
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	107	63	46	42	172
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	865	46	167	140	617
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	97	75	107	156	148
Magnesium	7439-95-4	1	mg/L	102	43	23	40	62
Sodium	7440-23-5	1	mg/L	492	57	134	98	349
Potassium	7440-09-7	1	mg/L	29	6	9	12	28
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	34.0	8.52	12.6	15.6	29.3
ø Total Cations	----	0.01	meq/L	35.4	9.91	13.3	15.6	28.4
ø Ionic Balance	----	0.01	%	2.01	7.54	2.50	0.02	1.58
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	6	3	3	24	19
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	0.08	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	0.09	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.02	0.02	1.38	0.23
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	0.12	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW199_201216	0089_MW203_201216	0089_MW202_201216	0089_MW516_201216	0089_MW261_201216
				Sampling date / time	16-Dec-2020 10:12	16-Dec-2020 10:27	16-Dec-2020 10:46	16-Dec-2020 11:08	16-Dec-2020 11:39
Compound	CAS Number	LOR	Unit		EP2014087-006	EP2014087-007	EP2014087-008	EP2014087-009	EP2014087-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**0.04**	**5.15**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	**0.16**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	**0.02**	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.09**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW199_201216	0089_MW203_201216	0089_MW202_201216	0089_MW516_201216	0089_MW261_201216
				Sampling date / time	16-Dec-2020 10:12	16-Dec-2020 10:27	16-Dec-2020 10:46	16-Dec-2020 11:08	16-Dec-2020 11:39
Compound	CAS Number	LOR	Unit		EP2014087-006	EP2014087-007	EP2014087-008	EP2014087-009	EP2014087-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.02**	**0.06**	**7.09**	**0.23**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.02**	**0.06**	**6.53**	**0.23**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.02**	**0.06**	**6.88**	**0.23**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**111**	**106**	**111**	**108**
13C8-PFOA	----	0.02	%		**96.2**	**96.7**	**95.9**	**104**	**105**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014087**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17191	Issue Date	: 30-Dec-2020
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW
[redacted]	Instrument Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3442744)									
EP2014044-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.94	7.91	0.378	0% - 20%
EP2014077-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.00	7.99	0.125	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3442748)									
EP2014087-009	0089_MW516_201216	EA005-P: pH Value	----	0.01	pH Unit	7.69	7.69	0.00	0% - 20%
EP2014204-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.14	7.10	0.562	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3436743)									
EP2014087-009	0089_MW516_201216	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	894	904	1.11	0% - 20%
EP2014087-001	0089_MW196_201216	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	410	440	7.06	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3436744)									
EP2014090-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	99	105	5.64	0% - 20%
EP2014087-001	0089_MW196_201216	EA025H: Suspended Solids (SS)	----	5	mg/L	238	233	2.02	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3442743)									
EP2014044-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	141	140	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	141	140	0.00	0% - 20%
EP2014077-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	114	114	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	114	114	0.00	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3442747)									
EP2014087-009	0089_MW516_201216	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	542	542	0.00	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3442747) - continued									
EP2014087-009	0089_MW516_201216	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	542	542	0.00	0% - 20%
EP2014204-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	23	22	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	23	22	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3427112)									
EP2014087-001	0089_MW196_201216	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	25	25	0.00	0% - 20%
EP2014087-010	0089_MW261_201216	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	172	172	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3427113)									
EP2014087-001	0089_MW196_201216	ED045G: Chloride	16887-00-6	1	mg/L	33	34	0.00	0% - 20%
EP2014087-010	0089_MW261_201216	ED045G: Chloride	16887-00-6	1	mg/L	617	614	0.461	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3429377)									
EP2014087-001	0089_MW196_201216	ED093F: Calcium	7440-70-2	1	mg/L	81	82	1.60	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	21	22	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	26	26	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EP2014090-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	509	502	1.45	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1590	1570	1.06	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11900	11800	0.843	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	660	655	0.669	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3434148)									
EP2014087-001	0089_MW196_201216	EP005: Total Organic Carbon	----	1	mg/L	8	11	33.6	0% - 50%
EP2014092-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	4	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.31	0.26	15.6	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.13	0.13	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.11	0.10	14.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3436262)									
EP2014087-007	0089_MW203_201216	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436260) - continued									
EP2014047-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	14.0	15.0	7.07	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	15.0	15.9	6.17	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	3.42	3.22	5.88	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	4.2	3.7	12.8	0% - 20%
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436262)									
EP2014087-007	0089_MW203_201216	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436262)									
EP2014087-007	0089_MW203_201216	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436262) - continued									
EP2014087-007	0089_MW203_201216	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.06	0.06	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436262)									
EP2014087-007	0089_MW203_201216	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3436260)									
EP2014047-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	37.2	38.4	3.02	0% - 20%
EP231P: PFAS Sums (QC Lot: 3436262)									
EP2014087-007	0089_MW203_201216	EP231X: Sum of PFAS	----	0.01	µg/L	0.02	0.01	66.7	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3442744)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3442748)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3436743)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	88.1	114
				<10	1000 mg/L	104	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3436744)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	107	89.1	120
				<5	1000 mg/L	97.5	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3442743)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	115	81.2	126
				<1	200 mg/L	99.4	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3442747)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	112	81.2	126
				<1	200 mg/L	98.8	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3427112)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3427113)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.4	87.9	114
				<1	1000 mg/L	97.7	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3429377)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	103	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.0	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3429377) - continued								
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.4	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.4	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3434148)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	114	87.2	116
				<1	100 mg/L	112	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436260)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	93.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	83.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	82.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	83.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	81.0	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436262)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	81.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	91.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	83.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	82.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	83.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	72.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436260)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	93.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	91.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	90.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	86.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	98.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	87.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	81.8	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436262)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	113	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	92.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	94.8	69.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436262) - continued								
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	82.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	75.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	74.7	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436260)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	101	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	101	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	91.8	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	88.0	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	86.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	103	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436262)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	87.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	86.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	75.5	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	80.1	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	80.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	78.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	101	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436260)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	89.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	96.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	83.8	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436262)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	91.0	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	94.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	84.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	85.6	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3427112)							
EP2014087-001	0089_MW196_201216	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	104	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3427113)							
EP2014087-001	0089_MW196_201216	ED045G: Chloride	16887-00-6	1000 mg/L	96.4	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3434148)							
EP2014087-002	0089_QC116_201216	EP005: Total Organic Carbon	----	100 mg/L	110	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014087**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 30-Dec-2020
Sampler	: [redacted] [redacted]	No. of samples received	: 10
Order number	: DEF19009/730	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW196_201216, 0089_QC116_201216, 0089_MW193_201216, 0089_195S_201216, 0089_195D_201216, 0089_MW199_201216, 0089_MW203_201216, 0089_MW202_201216, 0089_MW516_201216, 0089_MW261_201216	----	----	----	29-Dec-2020	16-Dec-2020	**13**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	38	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	38	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW196_201216, 0089_QC116_201216, 0089_MW193_201216, 0089_195S_201216, 0089_195D_201216, 0089_MW199_201216, 0089_MW203_201216, 0089_MW202_201216, 0089_MW516_201216, 0089_MW261_201216	**16-Dec-2020**	**----**	----	----	**29-Dec-2020**	16-Dec-2020	×

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW196_201216, 0089_QC116_201216, 0089_MW193_201216, 0089_195S_201216, 0089_195D_201216, 0089_MW199_201216, 0089_MW203_201216, 0089_MW202_201216, 0089_MW516_201216, 0089_MW261_201216	**16-Dec-2020**	**----**	----	----	**23-Dec-2020**	23-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW196_201216, 0089_QC116_201216, 0089_MW193_201216, 0089_195S_201216, 0089_195D_201216, 0089_MW199_201216, 0089_MW203_201216, 0089_MW202_201216, 0089_MW516_201216, 0089_MW261_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	23-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW196_201216, 0089_QC116_201216, 0089_MW193_201216, 0089_195S_201216, 0089_195D_201216, 0089_MW199_201216, 0089_MW203_201216, 0089_MW202_201216, 0089_MW516_201216, 0089_MW261_201216	**16-Dec-2020**	**----**	----	----	**29-Dec-2020**	30-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW196_201216, 0089_QC116_201216, 0089_MW193_201216, 0089_195S_201216, 0089_195D_201216, 0089_MW199_201216, 0089_MW203_201216, 0089_MW202_201216, 0089_MW516_201216, 0089_MW261_201216	**16-Dec-2020**	**----**	----	----	**30-Dec-2020**	13-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW196_201216, 0089_QC116_201216, 0089_MW193_201216, 0089_195S_201216, 0089_195D_201216, 0089_MW199_201216, 0089_MW203_201216, 0089_MW202_201216, 0089_MW516_201216, 0089_MW261_201216	**16-Dec-2020**	**----**	----	----	**30-Dec-2020**	13-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW196_201216, 0089_QC116_201216, 0089_MW193_201216, 0089_195S_201216, 0089_195D_201216, 0089_MW199_201216, 0089_MW203_201216, 0089_MW202_201216, 0089_MW516_201216, 0089_MW261_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	23-Dec-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW196_201216, 0089_MW193_201216, 0089_195D_201216, 0089_MW203_201216, 0089_MW516_201216, 0089_QC116_201216, 0089_195S_201216, 0089_MW199_201216, 0089_MW202_201216, 0089_MW261_201216	**16-Dec-2020**	**----**	----	----	**21-Dec-2020**	13-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW196_201216, 0089_MW193_201216, 0089_195D_201216, 0089_MW203_201216, 0089_MW516_201216, 0089_QC116_201216, 0089_195S_201216, 0089_MW199_201216, 0089_MW202_201216, 0089_MW261_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW196_201216, 0089_MW193_201216, 0089_195D_201216, 0089_MW203_201216, 0089_MW516_201216, 0089_QC116_201216, 0089_195S_201216, 0089_MW199_201216, 0089_MW202_201216, 0089_MW261_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW196_201216, 0089_MW193_201216, 0089_195D_201216, 0089_MW203_201216, 0089_MW516_201216, 0089_QC116_201216, 0089_195S_201216, 0089_MW199_201216, 0089_MW202_201216, 0089_MW261_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW196_201216, 0089_MW193_201216, 0089_195D_201216, 0089_MW203_201216, 0089_MW516_201216, 0089_QC116_201216, 0089_195S_201216, 0089_MW199_201216, 0089_MW202_201216, 0089_MW261_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW196_201216, 0089_MW193_201216, 0089_195D_201216, 0089_MW203_201216, 0089_MW516_201216, 0089_QC116_201216, 0089_195S_201216, 0089_MW199_201216, 0089_MW202_201216, 0089_MW261_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	**5.56**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	38	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014087**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17191	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 16-Dec-2020 14:35	Issue Date	: 17-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 27.9
Receipt Detail	:	No. of samples received / analysed	: 10 / 10

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014087-001	16-Dec-2020 08:34	0089_MW196_201216	✓	✓	✓	✓	✓	✓	✓
EP2014087-002	16-Dec-2020 08:34	0089_QC116_201216	✓	✓	✓	✓	✓	✓	✓
EP2014087-003	16-Dec-2020 09:24	0089_MW193_201216	✓	✓	✓	✓	✓	✓	✓
EP2014087-004	16-Dec-2020 09:44	0089_195S_201216	✓	✓	✓	✓	✓	✓	✓
EP2014087-005	16-Dec-2020 09:45	0089_195D_201216	✓	✓	✓	✓	✓	✓	✓
EP2014087-006	16-Dec-2020 10:12	0089_MW199_201216	✓	✓	✓	✓	✓	✓	✓
EP2014087-007	16-Dec-2020 10:27	0089_MW203_201216	✓	✓	✓	✓	✓	✓	✓
EP2014087-008	16-Dec-2020 10:46	0089_MW202_201216	✓	✓	✓	✓	✓	✓	✓
EP2014087-009	16-Dec-2020 11:08	0089_MW516_201216	✓	✓	✓	✓	✓	✓	✓
EP2014087-010	16-Dec-2020 11:39	0089_MW261_201216	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014087-001	16-Dec-2020 08:34	0089_MW196_201216	✓
EP2014087-002	16-Dec-2020 08:34	0089_QC116_201216	✓
EP2014087-003	16-Dec-2020 09:24	0089_MW193_201216	✓
EP2014087-004	16-Dec-2020 09:44	0089_195S_201216	✓
EP2014087-005	16-Dec-2020 09:45	0089_195D_201216	✓
EP2014087-006	16-Dec-2020 10:12	0089_MW199_201216	✓
EP2014087-007	16-Dec-2020 10:27	0089_MW203_201216	✓
EP2014087-008	16-Dec-2020 10:46	0089_MW202_201216	✓
EP2014087-009	16-Dec-2020 11:08	0089_MW516_201216	✓
EP2014087-010	16-Dec-2020 11:39	0089_MW261_201216	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

ALS COC#: 17191 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 16/12 1435	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW196		16/12/2020 08:34 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_QC116		16/12/2020 08:34 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW193		16/12/2020 09:24 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_195S		16/12/2020 09:44 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_195D		16/12/2020 09:45 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_MW199		16/12/2020 10:12 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_MW203		16/12/2020 10:27 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		
008	0089_MW202		16/12/2020 10:46 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_MW516		16/12/2020 11:08 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division Perth

Work Order Reference

EP2014087

Telephone : 61-8-9406 1301

CHAIN OF CUSTODY

COC#: 17191 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:
QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW196	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_QC116	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW193	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_195S	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_195D	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 17191 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW261		16/12/2020 11:39 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

ALS COC#: 17191 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW199	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW203	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW202	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_MW516	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_MW261	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 17191 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW196	Clear Plastic Bottle - Natural	250 mL	00070719041818	Green	No	
001	0089_MW196	HDPE (no PTFE)	20 mL	00350019170487	Grey	No	
001	0089_MW196	HDPE (no PTFE)	20 mL	00350019170476	Grey	No	
001	0089_MW196	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049061	Purple	No	
002	0089_QC116	Clear Plastic Bottle - Natural	250 mL	00070719041775	Green	No	
002	0089_QC116	HDPE (no PTFE)	20 mL	00350019170651	Grey	No	
002	0089_QC116	HDPE (no PTFE)	20 mL	00350019170987	Grey	No	
002	0089_QC116	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049079	Purple	No	
003	0089_MW193	Clear Plastic Bottle - Natural	250 mL	00070719041716	Green	No	
003	0089_MW193	HDPE (no PTFE)	20 mL	00350019170802	Grey	No	
003	0089_MW193	HDPE (no PTFE)	20 mL	00350019170884	Grey	No	
003	0089_MW193	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049120	Purple	No	
004	0089_195S	Clear Plastic Bottle - Natural	250 mL	00070719041826	Green	No	
004	0089_195S	HDPE (no PTFE)	20 mL	00350019170683	Grey	No	
004	0089_195S	HDPE (no PTFE)	20 mL	00350019170490	Grey	No	
004	0089_195S	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049126	Purple	No	
005	0089_195D	Clear Plastic Bottle - Natural	250 mL	00070719041677	Green	No	
005	0089_195D	HDPE (no PTFE)	20 mL	00350019170889	Grey	No	
005	0089_195D	HDPE (no PTFE)	20 mL	00350019170805	Grey	No	
005	0089_195D	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049309	Purple	No	
006	0089_MW199	Clear Plastic Bottle - Natural	250 mL	00070719041740	Green	No	
006	0089_MW199	HDPE (no PTFE)	20 mL	00350019170965	Grey	No	
006	0089_MW199	HDPE (no PTFE)	20 mL	00350019170845	Grey	No	
006	0089_MW199	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049133	Purple	No	
007	0089_MW203	Clear Plastic Bottle - Natural	250 mL	00070719041777	Green	No	
007	0089_MW203	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049063	Purple	No	

CHAIN OF CUSTODY

COC#: 17191 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_MW203	HDPE (no PTFE)	20 mL	00350019170862	Grey	No	
007	0089_MW203	HDPE (no PTFE)	20 mL	00350019170619	Grey	No	
007	0089_MW203	HDPE (no PTFE)	20 mL	00350019170896	Grey	No	
007	0089_MW203	HDPE (no PTFE)	20 mL	00350019170961	Grey	No	
008	0089_MW202	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049317	Purple	No	
008	0089_MW202	HDPE (no PTFE)	20 mL	00350019170894	Grey	No	
008	0089_MW202	HDPE (no PTFE)	20 mL	00350019170890	Grey	No	
008	0089_MW202	Clear Plastic Bottle - Natural	250 mL	00070719041793	Green	No	
009	0089_MW516	Clear Plastic Bottle - Natural	250 mL	00070719041680	Green	No	
009	0089_MW516	HDPE (no PTFE)	20 mL	00350019171035	Grey	No	
009	0089_MW516	HDPE (no PTFE)	20 mL	00350019170933	Grey	No	
009	0089_MW516	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049049	Purple	No	
010	0089_MW261	Clear Plastic Bottle - Natural	250 mL	00070719041847	Green	No	
010	0089_MW261	HDPE (no PTFE)	20 mL	00350019170765	Grey	No	
010	0089_MW261	HDPE (no PTFE)	20 mL	00350019170826	Grey	No	
010	0089_MW261	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049269	Purple	No	

Total Bottle Count: ALS: 42, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014090**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020 14:35
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Dec-2020
C-O-C number	: 17210	Issue Date	: 30-Dec-2020 16:59
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 8		
No. of samples analysed	: 8		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW330_201216	0089_PW401_201216	0089_PW351_201216	0089_PW352_201216	0089_PW380_201216
				Sampling date / time	16-Dec-2020 10:23	16-Dec-2020 10:29	16-Dec-2020 10:36	16-Dec-2020 10:43	16-Dec-2020 10:49
					EP2014090-001	EP2014090-002	EP2014090-005	EP2014090-007	EP2014090-008
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.82**	**7.85**	**7.88**	**7.99**	**7.96**
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**36700**	**39700**	**40100**	**39400**	**40500**
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**99**	**76**	**155**	**107**	**45**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**118**	**122**	**144**	**114**	**121**
Total Alkalinity as CaCO3	----	1	mg/L		**118**	**122**	**144**	**114**	**121**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2900**	**2890**	**2860**	**2840**	**2950**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**20600**	**20200**	**20100**	**20100**	**20400**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**509**	**493**	**506**	**499**	**498**
Magnesium	7439-95-4	1	mg/L		**1590**	**1530**	**1590**	**1560**	**1550**
Sodium	7440-23-5	1	mg/L		**11900**	**11500**	**12000**	**11700**	**11600**
Potassium	7440-09-7	1	mg/L		**660**	**635**	**659**	**643**	**645**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**644**	**632**	**629**	**628**	**639**
ø Total Cations	----	0.01	meq/L		**691**	**667**	**695**	**679**	**673**
ø Ionic Balance	----	0.01	%		**3.52**	**2.66**	**4.95**	**3.84**	**2.60**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**3**	**6**	**4**	**3**	**2**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW330_201216	0089_PW401_201216	0089_PW351_201216	0089_PW352_201216	0089_PW380_201216
				Sampling date / time	16-Dec-2020 10:23	16-Dec-2020 10:29	16-Dec-2020 10:36	16-Dec-2020 10:43	16-Dec-2020 10:49
Compound	CAS Number	LOR	Unit		EP2014090-001	EP2014090-002	EP2014090-005	EP2014090-007	EP2014090-008
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW330_201216	0089_PW401_201216	0089_PW351_201216	0089_PW352_201216	0089_PW380_201216
				Sampling date / time	16-Dec-2020 10:23	16-Dec-2020 10:29	16-Dec-2020 10:36	16-Dec-2020 10:43	16-Dec-2020 10:49
					EP2014090-001	EP2014090-002	EP2014090-005	EP2014090-007	EP2014090-008
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	**112**	**111**	**119**	**113**
13C8-PFOA	----	0.02	%		**88.9**	**95.6**	**90.8**	**92.7**	**93.9**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW384_201216	0089_SW353_201216	0089_SW383_201216	----	----
			Sampling date / time	16-Dec-2020 10:32	16-Dec-2020 10:34	16-Dec-2020 10:40	----	----
Compound	CAS Number	LOR	Unit	EP2014090-003	EP2014090-004	EP2014090-006	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.85	8.10	7.58	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	38800	38500	39800	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	56	35	40	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	117	121	107	----	----
Total Alkalinity as CaCO3	----	1	mg/L	117	121	107	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2850	2810	2890	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20000	20000	20000	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	511	480	484	----	----
Magnesium	7439-95-4	1	mg/L	1590	1500	1500	----	----
Sodium	7440-23-5	1	mg/L	11900	11300	11300	----	----
Potassium	7440-09-7	1	mg/L	647	621	621	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	626	625	626	----	----
ø Total Cations	----	0.01	meq/L	690	655	655	----	----
ø Ionic Balance	----	0.01	%	4.91	2.32	2.22	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	2	4	15	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW384_201216	0089_SW353_201216	0089_SW383_201216	----	----
			Sampling date / time	16-Dec-2020 10:32	16-Dec-2020 10:34	16-Dec-2020 10:40	----	----
Compound	CAS Number	LOR	Unit	EP2014090-003	EP2014090-004	EP2014090-006	--------	--------
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW384_201216	0089_SW353_201216	0089_SW383_201216	----	----
				Sampling date / time	16-Dec-2020 10:32	16-Dec-2020 10:34	16-Dec-2020 10:40	----	----
Compound	CAS Number	LOR	Unit		EP2014090-003	EP2014090-004	EP2014090-006	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**112**	**113**	**111**	----	----
13C8-PFOA	----	0.02	%		**91.1**	**92.7**	**90.0**	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014090**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Dec-2020
C-O-C number	: 17210	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 8		
No. of samples analysed	: 8		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3442748)									
EP2014087-009	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.69	7.69	0.00	0% - 20%
EP2014204-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.14	7.10	0.562	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3436743)									
EP2014087-009	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	894	904	1.11	0% - 20%
EP2014087-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	410	440	7.06	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3436744)									
EP2014090-001	0089_PW330_201216	EA025H: Suspended Solids (SS)	----	5	mg/L	99	105	5.64	0% - 20%
EP2014087-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	238	233	2.02	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3442747)									
EP2014087-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	542	542	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	542	542	0.00	0% - 20%
EP2014204-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	23	22	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	23	22	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3427112)									
EP2014087-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	25	25	0.00	0% - 20%
EP2014087-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	172	172	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3427113)									
EP2014087-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	33	34	0.00	0% - 20%
EP2014087-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	617	614	0.461	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3429377)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3429377) - continued									
EP2014087-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	81	82	1.60	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	21	22	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	26	26	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EP2014090-001	0089_PW330_201216	ED093F: Calcium	7440-70-2	1	mg/L	509	502	1.45	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1590	1570	1.06	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11900	11800	0.843	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	660	655	0.669	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3430806)									
EP2014051-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	14	12	13.6	0% - 50%
EP2014053-008	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	13	11	17.5	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436262) - continued									
EP2014087-007	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.02	0.01	66.7	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3442748)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3436743)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	88.1	114
				<10	1000 mg/L	104	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3436744)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	107	89.1	120
				<5	1000 mg/L	97.5	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3442747)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	112	81.2	126
				<1	200 mg/L	98.8	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3427112)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3427113)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.4	87.9	114
				<1	1000 mg/L	97.7	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3429377)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	103	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.4	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.4	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3430806)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436262)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	81.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	91.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	83.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	82.6	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436262) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	83.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	72.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436262)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	113	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	92.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	94.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	82.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	75.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	74.7	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436262)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	87.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	86.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	75.5	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	80.1	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	80.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	78.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	101	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436262)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	91.0	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	94.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	84.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	85.6	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3427112)							
EP2014087-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	104	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3427113)							
EP2014087-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	96.4	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3430806)							
EP2014051-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	102	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014090**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 8
Order number	: DEF19009/730	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_PW330_201216, 0089_PW401_201216, 0089_SW384_201216, 0089_SW353_201216, 0089_PW351_201216, 0089_SW383_201216, 0089_PW352_201216, 0089_PW380_201216	----	----	----	29-Dec-2020	16-Dec-2020	**13**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_PW330_201216, 0089_PW401_201216, 0089_SW384_201216, 0089_SW353_201216, 0089_PW351_201216, 0089_SW383_201216, 0089_PW352_201216, 0089_PW380_201216	**16-Dec-2020**	**----**	----	----	**29-Dec-2020**	16-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_PW330_201216, 0089_PW401_201216, 0089_SW384_201216, 0089_SW353_201216, 0089_PW351_201216, 0089_SW383_201216, 0089_PW352_201216, 0089_PW380_201216	**16-Dec-2020**	**----**	----	----	**23-Dec-2020**	23-Dec-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
0089_PW330_201216,	0089_PW401_201216,	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	23-Dec-2020	✓
0089_SW384_201216,	0089_SW353_201216,							
0089_PW351_201216,	0089_SW383_201216,							
0089_PW352_201216,	0089_PW380_201216							
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_PW330_201216,	0089_PW401_201216,	**16-Dec-2020**	**----**	----	----	**29-Dec-2020**	30-Dec-2020	✓
0089_SW384_201216,	0089_SW353_201216,							
0089_PW351_201216,	0089_SW383_201216,							
0089_PW352_201216,	0089_PW380_201216							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_PW330_201216,	0089_PW401_201216,	**16-Dec-2020**	**----**	----	----	**30-Dec-2020**	13-Jan-2021	✓
0089_SW384_201216,	0089_SW353_201216,							
0089_PW351_201216,	0089_SW383_201216,							
0089_PW352_201216,	0089_PW380_201216							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_PW330_201216,	0089_PW401_201216,	**16-Dec-2020**	**----**	----	----	**30-Dec-2020**	13-Jan-2021	✓
0089_SW384_201216,	0089_SW353_201216,							
0089_PW351_201216,	0089_SW383_201216,							
0089_PW352_201216,	0089_PW380_201216							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_PW330_201216,	0089_PW401_201216,	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	23-Dec-2020	✓
0089_SW384_201216,	0089_SW353_201216,							
0089_PW351_201216,	0089_SW383_201216,							
0089_PW352_201216,	0089_PW380_201216							
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005)								
0089_PW330_201216,	0089_PW401_201216,	**16-Dec-2020**	**----**	----	----	**18-Dec-2020**	13-Jan-2021	✓
0089_SW384_201216,	0089_SW353_201216,							
0089_PW351_201216,	0089_SW383_201216,							
0089_PW352_201216,	0089_PW380_201216							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_PW330_201216,	0089_PW401_201216,	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
0089_SW384_201216,	0089_SW353_201216,							
0089_PW351_201216,	0089_SW383_201216,							
0089_PW352_201216,	0089_PW380_201216							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW330_201216, 0089_PW401_201216, 0089_SW384_201216, 0089_SW353_201216, 0089_PW351_201216, 0089_SW383_201216, 0089_PW352_201216, 0089_PW380_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW330_201216, 0089_PW401_201216, 0089_SW384_201216, 0089_SW353_201216, 0089_PW351_201216, 0089_SW383_201216, 0089_PW352_201216, 0089_PW380_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW330_201216, 0089_PW401_201216, 0089_SW384_201216, 0089_SW353_201216, 0089_PW351_201216, 0089_SW383_201216, 0089_PW352_201216, 0089_PW380_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW330_201216, 0089_PW401_201216, 0089_SW384_201216, 0089_SW353_201216, 0089_PW351_201216, 0089_SW383_201216, 0089_PW352_201216, 0089_PW380_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	**5.56**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014090**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17210	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 16-Dec-2020 14:35	Issue Date	: 17-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 27.9
Receipt Detail	:	No. of samples received / analysed	: 8 / 8

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014090-001	16-Dec-2020 10:23	0089_PW330_201216	✓	✓	✓	✓	✓	✓	✓
EP2014090-002	16-Dec-2020 10:29	0089_PW401_201216	✓	✓	✓	✓	✓	✓	✓
EP2014090-003	16-Dec-2020 10:32	0089_SW384_201216	✓	✓	✓	✓	✓	✓	✓
EP2014090-004	16-Dec-2020 10:34	0089_SW353_201216	✓	✓	✓	✓	✓	✓	✓
EP2014090-005	16-Dec-2020 10:36	0089_PW351_201216	✓	✓	✓	✓	✓	✓	✓
EP2014090-006	16-Dec-2020 10:40	0089_SW383_201216	✓	✓	✓	✓	✓	✓	✓
EP2014090-007	16-Dec-2020 10:43	0089_PW352_201216	✓	✓	✓	✓	✓	✓	✓
EP2014090-008	16-Dec-2020 10:49	0089_PW380_201216	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014090-001	16-Dec-2020 10:23	0089_PW330_201216	✓
EP2014090-002	16-Dec-2020 10:29	0089_PW401_201216	✓
EP2014090-003	16-Dec-2020 10:32	0089_SW384_201216	✓
EP2014090-004	16-Dec-2020 10:34	0089_SW353_201216	✓
EP2014090-005	16-Dec-2020 10:36	0089_PW351_201216	✓
EP2014090-006	16-Dec-2020 10:40	0089_SW383_201216	✓
EP2014090-007	16-Dec-2020 10:43	0089_PW352_201216	✓
EP2014090-008	16-Dec-2020 10:49	0089_PW380_201216	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

ALS COC#: 17210 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 16/12 1435	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW330		16/12/2020 10:23 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW401		16/12/2020 10:29 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_SW384		16/12/2020 10:32 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_SW353		16/12/2020 10:34 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_PW351		16/12/2020 10:36 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_SW383		16/12/2020 10:40 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_PW352		16/12/2020 10:43 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_PW380		16/12/2020 10:49 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2014090

Telephone : + 61-8-9406 1301

CHAIN OF CUSTODY

COC#: **17210** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW330	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW401	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_SW384	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW353	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_PW351	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **17210** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_SW383	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW352	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_PW380	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 17210 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW330	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048990	Purple	No	
001	0089_PW330	Clear Plastic Bottle - Natural	250 mL	00070719041689	Green	No	
001	0089_PW330	HDPE (no PTFE)	20 mL	00350019170906	Grey	No	
001	0089_PW330	HDPE (no PTFE)	20 mL	00350019170879	Grey	No	
002	0089_PW401	HDPE (no PTFE)	20 mL	00350019170537	Grey	No	
002	0089_PW401	HDPE (no PTFE)	20 mL	00350019170715	Grey	No	
002	0089_PW401	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049051	Purple	No	
002	0089_PW401	Clear Plastic Bottle - Natural	250 mL	00070719041766	Green	No	
003	0089_SW384	HDPE (no PTFE)	20 mL	00350019170738	Grey	No	
003	0089_SW384	HDPE (no PTFE)	20 mL	00350019170811	Grey	No	
003	0089_SW384	Clear Plastic Bottle - Natural	250 mL	00070719041687	Green	No	
003	0089_SW384	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049159	Purple	No	
004	0089_SW353	Clear Plastic Bottle - Natural	250 mL	00070719041837	Green	No	
004	0089_SW353	HDPE (no PTFE)	20 mL	00350019171020	Grey	No	
004	0089_SW353	HDPE (no PTFE)	20 mL	00350019170864	Grey	No	
004	0089_SW353	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049315	Purple	No	
005	0089_PW351	HDPE (no PTFE)	20 mL	00350019170846	Grey	No	
005	0089_PW351	HDPE (no PTFE)	20 mL	00350019170931	Grey	No	
005	0089_PW351	Clear Plastic Bottle - Natural	250 mL	00070719041693	Green	No	
005	0089_PW351	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048982	Purple	No	
006	0089_SW383	HDPE (no PTFE)	20 mL	00350019170489	Grey	No	
006	0089_SW383	Clear Plastic Bottle - Natural	250 mL	00070719041802	Green	No	
006	0089_SW383	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049147	Purple	No	
006	0089_SW383	HDPE (no PTFE)	20 mL	00350019171005	Grey	No	
007	0089_PW352	Clear Plastic Bottle - Natural	250 mL	00070719041822	Green	No	
007	0089_PW352	HDPE (no PTFE)	20 mL	00350019170501	Grey	No	

CHAIN OF CUSTODY

COC#: 17210 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_PW352	HDPE (no PTFE)	20 mL	00350019170819	Grey	No	
007	0089_PW352	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048921	Purple	No	
008	0089_PW380	Amber TOC Vial - Sulfuric Acid	40 mL	00180220048974	Purple	No	
008	0089_PW380	Clear Plastic Bottle - Natural	250 mL	00070719041700	Green	No	
008	0089_PW380	HDPE (no PTFE)	20 mL	00350019170581	Grey	No	
008	0089_PW380	HDPE (no PTFE)	20 mL	00350019170486	Grey	No	

Total Bottle Count: ALS: 32, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014091**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020 14:35
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17211	Issue Date	: 30-Dec-2020 16:19
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD350_201216	0089_SD401_201216	0089_SD351_201216	0089_SD380_201216	0089_SD352_201216
				Sampling date / time	16-Dec-2020 10:25	16-Dec-2020 10:27	16-Dec-2020 10:38	16-Dec-2020 10:45	16-Dec-2020 11:28
					EP2014091-001	EP2014091-002	EP2014091-003	EP2014091-004	EP2014091-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**9.2**	**9.3**	**9.5**	**9.4**	**9.6**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**3220**	**2140**	**1450**	**1800**	**1320**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**21.7**	**14.0**	**9.6**	**9.2**	**7.0**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**3.2**	**3.1**	**4.1**	**2.5**	**4.2**
Exchangeable Magnesium	----	0.1	meq/100g		**0.4**	**0.4**	**0.4**	**0.3**	**0.4**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		**0.2**	**0.2**	**0.2**	**0.2**	**0.2**
Cation Exchange Capacity	----	0.1	meq/100g		**3.8**	**3.7**	**4.8**	**3.0**	**4.9**
Exchangeable Sodium Percent	----	0.1	%		**6.1**	**5.5**	**5.0**	**7.5**	**5.2**
EP004: Organic Matter									
Organic Matter	----	0.5	%		**0.7**	<0.5	<0.5	<0.5	<0.5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0004**	**0.0004**	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD350_201216	0089_SD401_201216	0089_SD351_201216	0089_SD380_201216	0089_SD352_201216
				Sampling date / time	16-Dec-2020 10:25	16-Dec-2020 10:27	16-Dec-2020 10:38	16-Dec-2020 10:45	16-Dec-2020 11:28
Compound	CAS Number	LOR	Unit		EP2014091-001	EP2014091-002	EP2014091-003	EP2014091-004	EP2014091-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0004**	**0.0004**	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD350_201216	0089_SD401_201216	0089_SD351_201216	0089_SD380_201216	0089_SD352_201216
				Sampling date / time	16-Dec-2020 10:25	16-Dec-2020 10:27	16-Dec-2020 10:38	16-Dec-2020 10:45	16-Dec-2020 11:28
Compound	CAS Number	LOR	Unit		EP2014091-001	EP2014091-002	EP2014091-003	EP2014091-004	EP2014091-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0004**	**0.0004**	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0004**	**0.0004**	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**112**	**102**	**110**	**108**	**114**
13C8-PFOA	----	0.0002	%		**112**	**102**	**113**	**111**	**109**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD381_201216	----	----	----	----
			Sampling date / time	16-Dec-2020 11:30	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2014091-006	--------	--------	--------	--------
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.5**	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1500**	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**8.7**	----	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**2.8**	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.3**	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**3.3**	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**5.8**	----	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD381_201216	----	----	----	----
				Sampling date / time	16-Dec-2020 11:30	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2014091-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD381_201216	----	----	----	----
				Sampling date / time	16-Dec-2020 11:30	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2014091-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**107**	----	----	----	----
13C8-PFOA	----	0.0002	%		**111**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014091**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17211	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3433117)									
EP2014043-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.8	9.0	1.57	0% - 20%
EP2014091-005	0089_SD352_201216	EA002: pH Value	----	0.1	pH Unit	9.6	9.5	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3433116)									
EP2014043-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	2890	2900	0.345	0% - 20%
EP2014091-005	0089_SD352_201216	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	1320	1330	0.151	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3435059)									
EP2014091-001	0089_SD350_201216	EA055: Moisture Content	----	0.1	%	21.7	19.6	9.94	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3435037)									
EP2014043-001	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	3.0	2.7	10.6	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	4.0	4.3	6.96	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.6	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.1	0.1	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	4.7	5.1	7.15	0% - 20%
EP2014091-005	0089_SD352_201216	ED008: Exchangeable Sodium Percent	----	0.1	%	5.2	5.2	0.00	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	4.2	4.0	5.73	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.4	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	4.9	4.6	5.70	0% - 20%
EP004: Organic Matter (QC Lot: 3435040)									
EP2014043-001	Anonymous	EP004: Organic Matter	----	0.5	%	0.6	0.5	0.00	No Limit
EP2014091-006	0089_SD381_201216	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3433751)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3433751) - continued									
EP2014049-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP2014052-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3433751)									
EP2014049-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP2014052-004	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3433751)									
EP2014049-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3433751) - continued									
EP2014049-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2014052-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3433751)									
EP2014049-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2014052-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3433117)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	102	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3433116)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
ED008: Exchangeable Cations (QCLot: 3435037)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	97.6	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	95.2	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	104	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	106	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	97.8	79.9	110
EP004: Organic Matter (QCLot: 3435040)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	92.2	70.0	120
				<0.5	85 %	87.5	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3433751)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3433751)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	122	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	130	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3433751)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3433751) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	107	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3433751)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	106	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	119	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	113	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3433751)							
EP2014049-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	106	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	118	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	111	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	121	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	114	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	108	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3433751)							
EP2014049-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	114	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	120	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	118	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	121	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	115	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	122	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	115	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3433751) - continued							
EP2014049-001	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	114	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	106	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	110	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3433751)							
EP2014049-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	113	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	98.9	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	110	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	103	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	102	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	114	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	120	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3433751)							
EP2014049-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	113	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	128	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	124	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	108	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014091**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 6
Order number	: DEF19009/730	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002)								
0089_SD350_201216,	0089_SD401_201216,	**16-Dec-2020**	**21-Dec-2020**	23-Dec-2020	✓	**21-Dec-2020**	21-Dec-2020	✓
0089_SD351_201216,	0089_SD380_201216,							
0089_SD352_201216,	0089_SD381_201216							
EA010: Conductivity (1:5)								
Soil Glass Jar - Unpreserved (EA010)								
0089_SD350_201216,	0089_SD401_201216,	**16-Dec-2020**	**21-Dec-2020**	23-Dec-2020	✓	**21-Dec-2020**	18-Jan-2021	✓
0089_SD351_201216,	0089_SD380_201216,							
0089_SD352_201216,	0089_SD381_201216							
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
0089_SD350_201216,	0089_SD401_201216,	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	30-Dec-2020	✓
0089_SD351_201216,	0089_SD380_201216,							
0089_SD352_201216,	0089_SD381_201216							
ED008: Exchangeable Cations								
Soil Glass Jar - Unpreserved (ED008)								
0089_SD350_201216,	0089_SD401_201216,	**16-Dec-2020**	**23-Dec-2020**	13-Jan-2021	✓	**23-Dec-2020**	13-Jan-2021	✓
0089_SD351_201216,	0089_SD380_201216,							
0089_SD352_201216,	0089_SD381_201216							
EP004: Organic Matter								
Soil Glass Jar - Unpreserved (EP004)								
0089_SD350_201216,	0089_SD401_201216,	**16-Dec-2020**	**23-Dec-2020**	13-Jan-2021	✓	**23-Dec-2020**	13-Jan-2021	✓
0089_SD351_201216,	0089_SD380_201216,							
0089_SD352_201216,	0089_SD381_201216							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0089_SD350_201216,	0089_SD401_201216,	**16-Dec-2020**	**21-Dec-2020**	14-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓
0089_SD351_201216,	0089_SD380_201216,							
0089_SD352_201216,	0089_SD381_201216							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD350_201216, 0089_SD401_201216, 0089_SD351_201216, 0089_SD380_201216, 0089_SD352_201216, 0089_SD381_201216	**16-Dec-2020**	**21-Dec-2020**	14-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD350_201216, 0089_SD401_201216, 0089_SD351_201216, 0089_SD380_201216, 0089_SD352_201216, 0089_SD381_201216	**16-Dec-2020**	**21-Dec-2020**	14-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD350_201216, 0089_SD401_201216, 0089_SD351_201216, 0089_SD380_201216, 0089_SD352_201216, 0089_SD381_201216	**16-Dec-2020**	**21-Dec-2020**	14-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD350_201216, 0089_SD401_201216, 0089_SD351_201216, 0089_SD380_201216, 0089_SD352_201216, 0089_SD381_201216	**16-Dec-2020**	**21-Dec-2020**	14-Jun-2021	✓	**22-Dec-2020**	30-Jan-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
Sample Extraction for PFAS in solid matrices	ORG73	SOIL	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014091**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17211	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 16-Dec-2020 14:35	Issue Date	: 17-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 27.9
Receipt Detail	:	No. of samples received / analysed	: 6 / 6

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2014091-001	16-Dec-2020 10:25	0089_SD350_201216	✓	✓	✓	✓
EP2014091-002	16-Dec-2020 10:27	0089_SD401_201216	✓	✓	✓	✓
EP2014091-003	16-Dec-2020 10:38	0089_SD351_201216	✓	✓	✓	✓
EP2014091-004	16-Dec-2020 10:45	0089_SD380_201216	✓	✓	✓	✓
EP2014091-005	16-Dec-2020 11:28	0089_SD352_201216	✓	✓	✓	✓
EP2014091-006	16-Dec-2020 11:30	0089_SD381_201216	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ENMRG (ENMRG) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

(ALS) COC#: 17211 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted]	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 16/12 1435	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD350		16/12/2020 10:25 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD401		16/12/2020 10:27 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD351		16/12/2020 10:38 AM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD380		16/12/2020 10:45 AM	Soil	ALS: 2 Non ALS: 0	No		X		
005	0089_SD352		16/12/2020 11:28 AM	Soil	ALS: 2 Non ALS: 0	No		X		
006	0089_SD381		16/12/2020 11:30 AM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division
Perth
Work Order Reference
EP2014091

Telephone : + 61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: 17211 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD350	HDPE Soil Jar	200 mL	00620719068423	Grey	No	
001	0089_SD350	Soil Glass Jar - Unpreserved	150 mL	00260220067791	Orange	No	
002	0089_SD401	HDPE Soil Jar	200 mL	00620719062812	Grey	No	
002	0089_SD401	Soil Glass Jar - Unpreserved	150 mL	00260520041075	Orange	No	
003	0089_SD351	Soil Glass Jar - Unpreserved	150 mL	00260220067765	Orange	No	
003	0089_SD351	HDPE Soil Jar	200 mL	00620719068377	Grey	No	
004	0089_SD380	Soil Glass Jar - Unpreserved	150 mL	00260220067857	Orange	No	
004	0089_SD380	HDPE Soil Jar	200 mL	00620719062897	Grey	No	
005	0089_SD352	HDPE Soil Jar	200 mL	00620719062881	Grey	No	
005	0089_SD352	Soil Glass Jar - Unpreserved	150 mL	00260520022005	Orange	No	
006	0089_SD381	Soil Glass Jar - Unpreserved	150 mL	00260220067614	Orange	No	
006	0089_SD381	HDPE Soil Jar	200 mL	00620719068352	Grey	No	

Total Bottle Count: ALS: 12, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014092**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020 14:35
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17220	Issue Date	: 30-Dec-2020 16:20
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW
[redacted]	Instrument Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- TDS by method EA-015 may bias high for sample #2 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW259_201216	0089_MW518_201216	0089_MW010_201216	----	----
			Sampling date / time	16-Dec-2020 11:10	16-Dec-2020 11:20	16-Dec-2020 11:39	----	----
Compound	CAS Number	LOR	Unit	EP2014092-001	EP2014092-002	EP2014092-003	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.89**	**8.02**	**7.81**	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**352**	**1470**	**1440**	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**1510**	**1310**	**48**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**291**	**336**	**451**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**291**	**336**	**451**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**14**	**184**	**98**	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**39**	**451**	**600**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**84**	**132**	**112**	----	----
Magnesium	7439-95-4	1	mg/L	**13**	**68**	**65**	----	----
Sodium	7440-23-5	1	mg/L	**27**	**226**	**308**	----	----
Potassium	7440-09-7	1	mg/L	**3**	**18**	**24**	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**7.20**	**23.3**	**28.0**	----	----
ø Total Cations	----	0.01	meq/L	**6.51**	**22.5**	**24.9**	----	----
ø Ionic Balance	----	0.01	%	**5.05**	**1.73**	**5.72**	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**5**	**8**	**11**	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	**0.07**	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.14**	<0.02	**0.08**	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW259_201216	0089_MW518_201216	0089_MW010_201216	----	----
				Sampling date / time	16-Dec-2020 11:10	16-Dec-2020 11:20	16-Dec-2020 11:39	----	----
Compound	CAS Number	LOR	Unit		EP2014092-001	EP2014092-002	EP2014092-003	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.37**	<0.01	**0.02**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.11**	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.20**	<0.02	**0.03**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.03**	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW259_201216	0089_MW518_201216	0089_MW010_201216	----	----
				Sampling date / time	16-Dec-2020 11:10	16-Dec-2020 11:20	16-Dec-2020 11:39	----	----
Compound	CAS Number	LOR	Unit		EP2014092-001	EP2014092-002	EP2014092-003	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.92**	<0.01	**0.13**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.51**	<0.01	**0.10**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.85**	<0.01	**0.13**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**113**	**106**	**118**	----	----
13C8-PFOA	----	0.02	%		**93.6**	**84.6**	**95.5**	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014092**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17220	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW
[redacted]	Instrument Chemist	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3438206)									
EP2014083-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.14	8.10	0.493	0% - 20%
EP2014093-004	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.53	8.53	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3436751)									
EP2014212-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	236	250	5.75	0% - 20%
EP2014092-001	0089_MW259_201216	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	352	358	1.83	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3436752)									
EP2014092-001	0089_MW259_201216	EA025H: Suspended Solids (SS)	----	5	mg/L	1510	1250	18.5	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3438205)									
EP2014083-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	206	207	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	206	207	0.00	0% - 20%
EP2014093-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	14	14	0.00	0% - 50%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	153	154	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	168	168	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3430577)									
EP2013988-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3030	3070	1.25	0% - 20%
EP2014121-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	863	869	0.692	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3430578)									
EP2013988-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	20100	20200	0.193	0% - 20%
EP2014121-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2100	2130	1.40	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3429377)									
EP2014087-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	81	82	1.60	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3429377) - continued									
EP2014087-001	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	21	22	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	26	26	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EP2014090-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	509	502	1.45	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1590	1570	1.06	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11900	11800	0.843	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	660	655	0.669	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3429378)									
EP2014092-003	0089_MW010_201216	ED093F: Calcium	7440-70-2	1	mg/L	112	110	2.08	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	65	65	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	308	310	0.683	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	24	24	0.00	0% - 20%
EP2014211-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	193	198	2.16	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	558	564	1.10	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2490	2520	1.13	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	33	34	0.00	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3434148)									
EP2014087-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	8	11	33.6	0% - 50%
EP2014092-001	0089_MW259_201216	EP005: Total Organic Carbon	----	1	mg/L	5	4	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436262)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436262) - continued									
EP2014087-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.02	0.01	66.7	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3438206)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3436751)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.0	88.1	114
				<10	1000 mg/L	101	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3436752)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	110	89.1	120
				<5	1000 mg/L	102	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3438205)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	111	81.2	126
				<1	200 mg/L	98.9	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3430577)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	87.7	113
				<1	500 mg/L	109	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3430578)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	93.2	87.9	114
				<1	1000 mg/L	102	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3429377)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	103	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.4	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.4	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3429378)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.9	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.3	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.3	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3434148)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	114	87.2	116
				<1	100 mg/L	112	87.2	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436262)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	81.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	91.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	83.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	82.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	83.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	72.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436262)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	113	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	92.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	94.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	82.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	75.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	74.7	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436262)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	87.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	86.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	75.5	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	80.1	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	80.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	78.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	101	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436262)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	91.0	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	94.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	84.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	85.6	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3430577)							
EP2013988-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3430578)							
EP2013988-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3434148)							
EP2014087-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	110	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014092**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 3
Order number	: DEF19009/730	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2013988--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2013988--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	----	----	----	23-Dec-2020	16-Dec-2020	**7**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**----**	----	----	**23-Dec-2020**	16-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	23-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	23-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**----**	----	----	**23-Dec-2020**	30-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	13-Jan-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	13-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	23-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**----**	----	----	**21-Dec-2020**	13-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW259_201216, 0089_MW518_201216, 0089_MW010_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	**5.56**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014092**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17220	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 16-Dec-2020 14:35	Issue Date	: 17-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 27.9
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014092-001	16-Dec-2020 11:10	0089_MW259_201216	✓	✓	✓	✓	✓	✓	✓
EP2014092-002	16-Dec-2020 11:20	0089_MW518_201216	✓	✓	✓	✓	✓	✓	✓
EP2014092-003	16-Dec-2020 11:39	0089_MW010_201216	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014092-001	16-Dec-2020 11:10	0089_MW259_201216	✓
EP2014092-002	16-Dec-2020 11:20	0089_MW518_201216	✓
EP2014092-003	16-Dec-2020 11:39	0089_MW010_201216	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ENMRG (ENMRG) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

COC#: **17220** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO [redacted]

EMAIL INVOICES TO

RELINQUISHED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME: [redacted] 16/12 1435	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW259		16/12/2020 11:10 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW518		16/12/2020 11:20 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW010		16/12/2020 11:39 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division Perth

Work Order Reference

EP2014092

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 17220 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW259	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW518	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW010	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **17220** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW259	Clear Plastic Bottle - Natural	250 mL	00070719041750	Green	No	
001	0089_MW259	HDPE (no PTFE)	20 mL	00350019170568	Grey	No	
001	0089_MW259	HDPE (no PTFE)	20 mL	00350019170586	Grey	No	
001	0089_MW259	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049113	Purple	No	
002	0089_MW518	Clear Plastic Bottle - Natural	250 mL	00070719041688	Green	No	
002	0089_MW518	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049293	Purple	No	
002	0089_MW518	HDPE (no PTFE)	20 mL	00350019170736	Grey	No	
002	0089_MW518	HDPE (no PTFE)	20 mL	00350019170711	Grey	No	
003	0089_MW010	Clear Plastic Bottle - Natural	250 mL	00070719041692	Green	No	
003	0089_MW010	HDPE (no PTFE)	20 mL	00350019170730	Grey	No	
003	0089_MW010	HDPE (no PTFE)	20 mL	00350019170600	Grey	No	
003	0089_MW010	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049319	Purple	No	

Total Bottle Count: ALS: 12, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014104**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020 14:35
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17215	Issue Date	: 30-Dec-2020 16:21
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW381_201216	0089_PW382_201216	----	----	----
				Sampling date / time	16-Dec-2020 10:47	16-Dec-2020 10:48	----	----	----
Compound	CAS Number	LOR	Unit		EP2014104-001	EP2014104-002	--------	--------	--------
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.99	8.05	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		42700	40000	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		36	14	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		113	118	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		113	118	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2840	2840	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		20000	20000	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		475	504	----	----	----
Magnesium	7439-95-4	1	mg/L		1520	1620	----	----	----
Sodium	7440-23-5	1	mg/L		11500	12400	----	----	----
Potassium	7440-09-7	1	mg/L		635	698	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		626	626	----	----	----
ø Total Cations	----	0.01	meq/L		665	716	----	----	----
ø Ionic Balance	----	0.01	%		3.08	6.71	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		7	5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_PW381_201216	0089_PW382_201216	----	----	----
			Sampling date / time	16-Dec-2020 10:47	16-Dec-2020 10:48	----	----	----
Compound	CAS Number	LOR	Unit	EP2014104-001	EP2014104-002	--------	--------	--------
				Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW381_201216	0089_PW382_201216	----	----	----
				Sampling date / time	16-Dec-2020 10:47	16-Dec-2020 10:48	----	----	----
Compound	CAS Number	LOR	Unit		EP2014104-001	EP2014104-002	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**110**	**118**	----	----	----
13C8-PFOA	----	0.02	%		**92.9**	**92.8**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014104**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17215	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3438206)									
EP2014083-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.14	8.10	0.493	0% - 20%
EP2014093-004	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.53	8.53	0.00	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3438210)									
EP2014104-002	0089_PW382_201216	EA005-P: pH Value	----	0.01	pH Unit	8.05	8.10	0.619	0% - 20%
EP2014190-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.02	8.02	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3436751)									
EP2014212-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	236	250	5.75	0% - 20%
EP2014092-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	352	358	1.83	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3436752)									
EP2014092-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	1510	1250	18.5	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3438205)									
EP2014083-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	206	207	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	206	207	0.00	0% - 20%
EP2014093-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	14	14	0.00	0% - 50%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	153	154	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	168	168	0.00	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3438209)									
EP2014104-002	0089_PW382_201216	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	118	120	1.27	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	118	120	1.27	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3438209) - continued									
EP2014190-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	422	424	0.362	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	422	424	0.362	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3427112)									
EP2014087-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	25	25	0.00	0% - 20%
EP2014087-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	172	172	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3427113)									
EP2014087-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	33	34	0.00	0% - 20%
EP2014087-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	617	614	0.461	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3429380)									
EP2014104-001	0089_PW381_201216	ED093F: Calcium	7440-70-2	1	mg/L	475	536	12.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1520	1700	11.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11500	13000	12.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	635	731	14.0	0% - 20%
EP2014142-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	8	7	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	8	8	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	81	80	1.63	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3434148)									
EP2014087-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	8	11	33.6	0% - 50%
EP2014092-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	4	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3436262) - continued									
EP2014087-007	Anonymous	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3436262)									
EP2014087-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.02	0.01	66.7	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3438206)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3438210)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3436751)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.0	88.1	114
				<10	1000 mg/L	101	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3436752)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	110	89.1	120
				<5	1000 mg/L	102	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3438205)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	111	81.2	126
				<1	200 mg/L	98.9	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3438209)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	107	81.2	126
				<1	200 mg/L	100	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3427112)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3427113)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.4	87.9	114
				<1	1000 mg/L	97.7	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3429380)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.1	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.8	88.0	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3429380) - continued								
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.8	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.2	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3434148)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	114	87.2	116
				<1	100 mg/L	112	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436262)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	81.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	91.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	83.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	82.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	83.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	72.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436262)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	113	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	92.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	94.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	82.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	93.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	75.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	74.7	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436262)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	87.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	86.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	75.5	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	80.1	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	80.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	78.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	101	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436262)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	91.0	63.0	143

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436262) - continued								
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	94.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	84.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	85.6	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3427112)							
EP2014087-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	104	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3427113)							
EP2014087-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	96.4	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3434148)							
EP2014087-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	110	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014104**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 30-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 2
Order number	: DEF19009/730	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_PW381_201216, 0089_PW382_201216	----	----	----	23-Dec-2020	16-Dec-2020	**7**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**----**	----	----	**23-Dec-2020**	16-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	23-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	23-Dec-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**----**	----	----	**23-Dec-2020**	30-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**----**	----	----	**30-Dec-2020**	13-Jan-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**----**	----	----	**30-Dec-2020**	13-Jan-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	23-Dec-2020	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**----**	----	----	**21-Dec-2020**	13-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW381_201216, 0089_PW382_201216	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	**5.56**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014104**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17215	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 16-Dec-2020 14:35	Issue Date	: 17-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 27.9
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014104-001	16-Dec-2020 10:47	0089_PW381_201216	✓	✓	✓	✓	✓	✓	✓
EP2014104-002	16-Dec-2020 10:48	0089_PW382_201216	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014104-001	16-Dec-2020 10:47	0089_PW381_201216	✓
EP2014104-002	16-Dec-2020 10:48	0089_PW382_201216	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ENMRG (ENMRG) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 17215 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] 16/12 1635	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW381		16/12/2020 10:47 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW382		16/12/2020 10:48 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2014104

Telephone : +61-8-9406 1201

CHAIN OF CUSTODY

COC#: **17215** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW381	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW382	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 17215 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW381	HDPE (no PTFE)	20 mL	00350019170639	Grey	No	
001	0089_PW381	HDPE (no PTFE)	20 mL	00350019170677	Grey	No	
001	0089_PW381	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049073	Purple	No	
001	0089_PW381	Clear Plastic Bottle - Natural	250 mL	00070719041699	Green	No	
002	0089_PW382	Clear Plastic Bottle - Natural	250 mL	00070719041783	Green	No	
002	0089_PW382	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049072	Purple	No	
002	0089_PW382	HDPE (no PTFE)	20 mL	00350019170640	Grey	No	
002	0089_PW382	HDPE (no PTFE)	20 mL	00350019170647	Grey	No	

Total Bottle Count: ALS: 8, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2014106**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020 14:30
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17222	Issue Date	: 24-Dec-2020 21:37
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EA025H: LCS 1 recovery for Suspended Solids falls outside ALS Dynamic Control Limit. However, it is within the acceptance criteria based on ALS DQO. No further action is required
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW257_201216	0089_MW255_201216	0089_QC301_201216	0089_QC401_201216	0089_QC402_201216
				Sampling date / time	16-Dec-2020 11:22	16-Dec-2020 11:39	16-Dec-2020 11:57	16-Dec-2020 11:58	16-Dec-2020 11:59
					EP2014106-001	EP2014106-002	EP2014106-003	EP2014106-004	EP2014106-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**8.17**	**7.96**	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**348**	**607**	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**139**	**1810**	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**180**	**384**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**180**	**384**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**14**	**33**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**42**	**88**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**67**	**116**	----	----	----
Magnesium	7439-95-4	1	mg/L		**8**	**21**	----	----	----
Sodium	7440-23-5	1	mg/L		**28**	**70**	----	----	----
Potassium	7440-09-7	1	mg/L		**3**	**3**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**5.07**	**10.8**	----	----	----
ø Total Cations	----	0.01	meq/L		**5.30**	**10.6**	----	----	----
ø Ionic Balance	----	0.01	%		**2.16**	**0.95**	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**7**	**3**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	**0.10**	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	**0.22**	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**0.03**	**2.44**	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW257_201216	0089_MW255_201216	0089_QC301_201216	0089_QC401_201216	0089_QC402_201216
				Sampling date / time	16-Dec-2020 11:22	16-Dec-2020 11:39	16-Dec-2020 11:57	16-Dec-2020 11:58	16-Dec-2020 11:59
Compound	CAS Number	LOR	Unit		EP2014106-001	EP2014106-002	EP2014106-003	EP2014106-004	EP2014106-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.94**	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.07**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.31**	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.12**	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.02**	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW257_201216	0089_MW255_201216	0089_QC301_201216	0089_QC401_201216	0089_QC402_201216
				Sampling date / time	16-Dec-2020 11:22	16-Dec-2020 11:39	16-Dec-2020 11:57	16-Dec-2020 11:58	16-Dec-2020 11:59
Compound	CAS Number	LOR	Unit		EP2014106-001	EP2014106-002	EP2014106-003	EP2014106-004	EP2014106-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.03**	**4.22**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.03**	**3.38**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.03**	**4.00**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**113**	**111**	**111**	**101**	**118**
13C8-PFOA	----	0.02	%		**100**	**100**	**104**	**103**	**104**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC302_201216	----	----	----	----
				Sampling date / time	16-Dec-2020 11:59	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2014106-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC302_201216	----	----	----	----
				Sampling date / time	16-Dec-2020 11:59	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2014106-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**115**	----	----	----	----
13C8-PFOA	----	0.02	%		**101**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2014106**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Order number	: DEF19009/730	Date Analysis Commenced	: 21-Dec-2020
C-O-C number	: 17222	Issue Date	: 24-Dec-2020
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 3433853)									
EP2013989-009	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.07	8.08	0.00	0% - 20%
EP2014105-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.09	8.08	0.124	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3436753)									
EP2014304-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	602	578	3.98	0% - 20%
EP2014106-001	0089_MW257_201216	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	348	336	3.36	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3436754)									
EP2014106-001	0089_MW257_201216	EA025H: Suspended Solids (SS)	----	5	mg/L	139	143	2.60	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3433852)									
EP2013989-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	123	123	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	123	123	0.00	0% - 20%
EP2014105-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	544	577	5.88	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	544	577	5.88	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3434223)									
EP2014106-001	0089_MW257_201216	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14	14	0.00	0% - 50%
EP2014272-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	106	104	1.05	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3434224)									
EP2014106-001	0089_MW257_201216	ED045G: Chloride	16887-00-6	1	mg/L	42	41	0.00	0% - 20%
EP2014272-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	186	189	1.37	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3429380)									
EP2014104-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	475	536	12.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 3429380) - continued									
EP2014104-001	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	1520	1700	11.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11500	13000	12.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	635	731	14.0	0% - 20%
EP2014142-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	8	7	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	8	8	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	81	80	1.63	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3434148)									
EP2014087-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	8	11	33.6	0% - 50%
EP2014092-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	4	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3433853)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98.5	102
				----	7 pH Unit	99.8	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3436753)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	105	88.1	114
				<10	1000 mg/L	108	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3436754)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	# 81.3	89.1	120
				<5	1000 mg/L	92.3	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3433852)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	110	81.2	126
				<1	200 mg/L	98.3	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3434223)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	109	87.7	113
				<1	500 mg/L	107	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3434224)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	104	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3429380)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.1	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.8	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.2	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3434148)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	114	87.2	116
				<1	100 mg/L	112	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436836)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	93.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	86.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	85.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	84.4	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3436836) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	84.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	77.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3436836)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	88.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	90.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	91.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	83.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	87.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	80.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	87.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	92.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	94.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	87.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3436836)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	86.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	80.4	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	82.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	85.0	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	80.9	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	93.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	111	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3436836)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	97.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	79.6	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3434223)							
EP2014106-001	0089_MW257_201216	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	122	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3434224)							
EP2014106-001	0089_MW257_201216	ED045G: Chloride	16887-00-6	1000 mg/L	100	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3434148)							
EP2014087-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	110	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2014106**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Dec-2020
Site	: DEF19009/Stirling	Issue Date	: 24-Dec-2020
Sampler	: [redacted], [redacted]	No. of samples received	: 6
Order number	: DEF19009/730	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EA025: Total Suspended Solids dried at 104 ± 2°C	QC-MRG2-34367530	----	**Suspended Solids (SS)**	----	81.3 %	89.1-120%	**Recovery less than lower control limit**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW257_201216,	0089_MW255_201216	----	----	----	21-Dec-2020	16-Dec-2020	**5**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_MW257_201216,	0089_MW255_201216	**16-Dec-2020**	**----**	----	----	**21-Dec-2020**	16-Dec-2020	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_MW257_201216,	0089_MW255_201216	**16-Dec-2020**	**----**	----	----	**23-Dec-2020**	23-Dec-2020	✓
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
0089_MW257_201216,	0089_MW255_201216	**16-Dec-2020**	**----**	----	----	**23-Dec-2020**	23-Dec-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_MW257_201216,	0089_MW255_201216	**16-Dec-2020**	**----**	----	----	**21-Dec-2020**	30-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_MW257_201216,	0089_MW255_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	13-Jan-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_MW257_201216,	0089_MW255_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	13-Jan-2021	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_MW257_201216,	0089_MW255_201216	**16-Dec-2020**	**----**	----	----	**22-Dec-2020**	23-Dec-2020	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005)								
0089_MW257_201216,	0089_MW255_201216	**16-Dec-2020**	**----**	----	----	**21-Dec-2020**	13-Jan-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW257_201216,	0089_MW255_201216,	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
0089_QC301_201216,	0089_QC401_201216,							
0089_QC402_201216,	0089_QC302_201216							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW257_201216,	0089_MW255_201216,	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
0089_QC301_201216,	0089_QC401_201216,							
0089_QC402_201216,	0089_QC302_201216							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0089_MW257_201216,	0089_MW255_201216,	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
0089_QC301_201216,	0089_QC401_201216,							
0089_QC402_201216,	0089_QC302_201216							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW257_201216,	0089_MW255_201216,	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
0089_QC301_201216,	0089_QC401_201216,							
0089_QC402_201216,	0089_QC302_201216							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0089_MW257_201216,	0089_MW255_201216,	**16-Dec-2020**	**23-Dec-2020**	14-Jun-2021	✓	**23-Dec-2020**	14-Jun-2021	✓
0089_QC301_201216,	0089_QC401_201216,							
0089_QC402_201216,	0089_QC302_201216							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	13	**15.38**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	2	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	13	**15.38**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	13	**7.69**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2014106**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 17222	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 16-Dec-2020 14:30	Issue Date	: 17-Dec-2020
Client Requested Due Date	: 30-Dec-2020	Scheduled Reporting Date	: **30-Dec-2020**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 27.9
Receipt Detail	:	No. of samples received / analysed	: 6 / 6

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2014106-001	16-Dec-2020 11:22	0089_MW257_201216	✓	✓	✓	✓	✓	✓	✓
EP2014106-002	16-Dec-2020 11:39	0089_MW255_201216	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2014106-001	16-Dec-2020 11:22	0089_MW257_201216	✓
EP2014106-002	16-Dec-2020 11:39	0089_MW255_201216	✓
EP2014106-003	16-Dec-2020 11:57	0089_QC301_201216	✓
EP2014106-004	16-Dec-2020 11:58	0089_QC401_201216	✓
EP2014106-005	16-Dec-2020 11:59	0089_QC402_201216	✓
EP2014106-006	16-Dec-2020 11:59	0089_QC302_201216	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

ALS COC#: 17222 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted]:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 16/12 1430	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW257		16/12/2020 11:22 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
002	0089_MW255		16/12/2020 11:39 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
003	0089_QC301		16/12/2020 11:57 AM	Water	ALS: 2 Non ALS: 0	No		X			
004	0089_QC401		16/12/2020 11:58 AM	Water	ALS: 2 Non ALS: 0	No		X			
005	0089_QC402		16/12/2020 11:59 AM	Water	ALS: 2 Non ALS: 0	No		X			
006	0089_QC302		16/12/2020 11:59 AM	Water	ALS: 2 Non ALS: 0	No		X			

Environmental Division
Perth
Work Order Reference
EP2014106

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: **17222** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW257	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW255	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 17222 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW257	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049284	Purple	No	
001	0089_MW257	HDPE (no PTFE)	20 mL	00350019170590	Grey	No	
001	0089_MW257	HDPE (no PTFE)	20 mL	00350019170627	Grey	No	
001	0089_MW257	Clear Plastic Bottle - Natural	250 mL	00070719041776	Green	No	
002	0089_MW255	HDPE (no PTFE)	20 mL	00350019171036	Grey	No	
002	0089_MW255	HDPE (no PTFE)	20 mL	00350019170886	Grey	No	
002	0089_MW255	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049322	Purple	No	
002	0089_MW255	Clear Plastic Bottle - Natural	250 mL	00070719041840	Green	No	
003	0089_QC301	HDPE (no PTFE)	20 mL	00350019170887	Grey	No	
003	0089_QC301	HDPE (no PTFE)	20 mL	00350019170796	Grey	No	
004	0089_QC401	HDPE (no PTFE)	20 mL	00350019170839	Grey	No	
004	0089_QC401	HDPE (no PTFE)	20 mL	00350019170469	Grey	No	
005	0089_QC402	HDPE (no PTFE)	20 mL	00350019171045	Grey	No	
005	0089_QC402	HDPE (no PTFE)	20 mL	00350019170729	Grey	No	
006	0089_QC302	HDPE (no PTFE)	20 mL	00350019170614	Grey	No	
006	0089_QC302	HDPE (no PTFE)	20 mL	00350019170901	Grey	No	

Total Bottle Count: ALS: 16, Non ALS: 0

APPENDIX

D

FIELD RECORDS & CALIBRATION CERTIFICATES

Monitoring Date	Monitoring Site ID	Sample_ID	Bore Depth (m)	SWL time	SWL (bTOC)	TOC (mAHD)	RWL (mAHD)	Other Observations on Bore/Site	Purge Method	Temp (Co)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Sample ID	Odour Comments	colour
16/12/2020	MW010	0089_MW010_201216	9.2	11:38	4.71	4.859	0.149		HydroSleeve	20.9	0.41	2362	1534	7.21	-192.7		Hydrocarbon odour	Clear
14/12/2020	MW109	0089_MW109_201214	4.44	10:52	4.115	4.446	0.331		HydroSleeve	22.3	0.73	1620	1111.5	7.4	-79.3	QC108, QC208		Cloudy
14/12/2020	MW112	0089_MW112_201214	4.74	11:12	3.46	3.973	0.513		HydroSleeve	21.9	1.76	653	448.5	7.52	-71.6			Clear,Cloudy
14/12/2020	MW117	0089_MW117_201214	6.18	11:31	3.32	3.762	0.442		HydroSleeve	20.3	0.74	943	611	7.18	30.9			Cloudy
14/12/2020	MW120	0089_MW120_201214	4.88	11:26	4.04	4.409	0.369		HydroSleeve	20.8	0.9	589	416	7.58	-49.9			Clear
14/12/2020	MW123	0089_MW123_201214	7.2	10:52	6.27	6.62	0.35		HandBailing	20.3	2.21	1655	1079	7.84	-125.8			Cloudy
14/12/2020	MW121	0089_MW121_201214	4.72	11:20	3.4	3.7	0.3		HydroSleeve	20	3.76	661	429	7.76	-12.4			Clear
14/12/2020	MW124	0089_MW124_201214	3.2	08:29	1.79	1.899	0.109		HydroSleeve	19.5	0.51	40107	29120	7.16	-188.3		Salty	Clear
14/12/2020	MW125	0089_MW125_201214	3.25	08:46	1.76	1.882	0.122		HydroSleeve	19.6	0.29	40970	29685	7.14	-187.9		Salty	Clear
14/12/2020	MW126	0089_MW126_201214	3.375	08:57	1.79	1.948	0.158		HydroSleeve	19.7	0.64	37968	370456	7.03	-217.1			Clear
14/12/2020	MW127	0089_MW127_201214	3.33	09:15	1.615	1.771	0.156		HydroSleeve	19.8	0.6	36014	26019.5	7.15	-210.3		Salty	Clear
14/12/2020	MW128		5.5	11:44				DRY	HydroSleeve									Clear
14/12/2020	MW137	0089_MW137_201214	3.9	10:16	1.89	2.058	0.168		HydroSleeve	21.3	1.86	55104		6.89	90.3			Clear
14/12/2020	MW139	0089_MW139_201214	5	08:29	2.05	2.273	0.223		HydroSleeve	21	2.45	6350		7.45	15.4			Clear
14/12/2020	MW141	0089_MW141_201214	5	11:30	2.78	3.025	0.245		HydroSleeve	21.3	1.04	31614		7.18	-180.8			Clear
14/12/2020	MW142	0089_MW142_201214	4	10:48	2.36	2.573	0.213		HydroSleeve	19.3	1.89	38842		7.27	-65.8			Clear
14/12/2020	MW147		5.2	11:33				Dry	HydroSleeve									Clear
14/12/2020	MW149	0089_MW149_201214	4	09:18	2.08	2.303	0.223		HydroSleeve	23.9	0.69	55331		8.04	49.5			Clear
14/12/2020	MW158	0089_MW158_201214	14.78	12:02	14.14	14.541	0.401		HydroSleeve	20.5	1.96	12880	9152	7.33	-103.8			Clear
14/12/2020	MW161	0089_MW161_201214	18.2	12:17	16.77	17.225	0.455		HydroSleeve	21.2	2.18	3354	2177	7.3	55.5			Brown
14/12/2020	MW166	0089_MW166_201214	11.4	12:38	11.28	11.89	0.61	Hand bailed. Not enough water for hydrasleeve	HandBailing	19.8	1.36	3668	2645.5	7.33	-36.3			Clear
14/12/2020	MW171	0089_MW171_201214	36.2	12:36	28.55	29.238	0.688		HydroSleeve	19.3	1.77	6683	4324	7.11	-219.2		Hydrocarbon like odour	Clear
14/12/2020	MW172		16.45	14:11				DRY	HydroSleeve									Clear
16/12/2020	MW173		9.585	09:09				DRY	HydroSleeve									Clear
16/12/2020	MW193	0089_MW193_201216	11.89	09:14	11.3	11.86	0.56		HydroSleeve	21.4	1.42	3257	2275	7.08	-116.7			Clear
16/12/2020	MW195-D	0089_MW195-D_201216	17.8	09:37	4.23	4.363	0.133		HydroSleeve	21.2	1.25	34195	23991.5	7.43	-96.6			Clear,Cloudy
16/12/2020	MW195-S	0089_MW195-S_201216	6.455	09:30	4.185	4.571	0.386		HydroSleeve	21.2	3.05	4742	3321.5	7.31	-30.2			Clear
16/12/2020	MW196	0089_MW196_201216	13.4	08:12	12.5	12.75	0.25	Bailer used due to shallow water	HandBailing	20.6	2.26	614	435.5	7.64	-15.1	QC116, QC216		Clear
15/12/2020	MW197		2.85	13:39				Dry	HydroSleeve									Clear
16/12/2020	MW199	0089_MW199_201216	12.525	09:54	11.27	11.8	0.53	Broken Hydrasleeve replaced	HydroSleeve	22	2.31	4121	2840.5	7.54	-24.5			Clear
15/12/2020	MW200	0089_MW200_201215	2.53	13:26	2.07	2.07			HydroSleeve	23.9	3.15	8837		7.66	-92.1	Qc115/qc215		Clear
16/12/2020	MW202	0089_MW202_201216	2.875	10:32	1.95	2.12	0.17	sampled with bailer	HandBailing	21.5	1.64	1209	845	7.54	-14.5			Clear
16/12/2020	MW203	0089_MW203_201216	11.79	10:17	10.605	10.855	0.25		HydroSleeve	22.2	1.78	985	676	7.61	-18.8			Clear
15/12/2020	MW214		6.93	10:26				DRY	HydroSleeve									Clear
15/12/2020	MW215		4.5	11:06				Dry	HydroSleeve									Clear
15/12/2020	MW216	0089_MW216_201215	9.5	09:55	7.91	8.329	0.419	Hydrasleeve broken. Replaced with new	HandBailing	20.9	2.02	1592	1124.5	7.25	0.6	QC113, QC213		Cloudy
15/12/2020	MW217	0089_MW217_201215	9.975	08:51	8.42	8.847	0.427		HydroSleeve	21.8	4.4	504	351	7.72	-7.8			Clear
15/12/2020	MW220		6.68	09:03				DRY	HydroSleeve									Clear
15/12/2020	MW224	0089_MW224_201215	13.38	09:12	13.06	13.372	0.312		HydroSleeve	21	4.66	835	585	7.73	-6.8			Clear
15/12/2020	MW225		5	09:44				Dry	HydroSleeve									Clear
15/12/2020	MW226	0089_MW226_201215	4.2	09:38	1.72	1.749	0.029		HydroSleeve	21.9	1.02	43297	28145	7.1	-40.2			Clear
15/12/2020	MW227	0089_MW227_201215	4.2	08:42	2.78	2.961	0.181		HydroSleeve	21	1.1	3487		7.38	-100.6			Clear
15/12/2020	MW228	0089_MW228_201215	3.75	08:29	2.065	2.23	0.165		HydroSleeve	20	0.89	29607		7.2	-69.7			Clear
15/12/2020	MW233	0089_MW233_201215	3.85	08:10	3.36	3.705	0.345		HydroSleeve	17.3	1.65	396.8	302.25	8.28	-118.8			Clear
15/12/2020	MW236	0089_MW236_201215	4.98	10:38	4.18	4.642	0.462	Hand bailed. Water too shallow for hydrasleeve	HandBailing	21	3.19	616	435.5	7.61	7.5			Clear,Cloudy
15/12/2020	MW238	0089_MW238_201215	5.96	12:04	4.505	4.827	0.322		HydroSleeve	22	1.51	656	455	7.65	-9.2	QC114, Q214		Clear,Cloudy
15/12/2020	MW239	0089_MW239_201215	6.275	12:30	3.725	4.03	0.305		HydroSleeve	21.3	1.03	635	442	7.6	9			Clear
15/12/2020	MW240	0089_MW240_201215	5.68	11:51	4.19	4.483	0.293		HydroSleeve	22.6	1.43	796	539.5	7.43	-14.1			Clear
15/12/2020	MW242	0089_MW242_201215	3.605	13:04	3.265	3.539	0.274		HydroSleeve	23.3	0.71	653	435.5	7.68	-12.9			Clear
15/12/2020	MW243	0089_MW243_201215	6.16	11:36	4.57	4.892	0.322		HydroSleeve	22.4	1.65	825	565.5	7.58	-9.2			Clear
15/12/2020	MW245	0089_MW245_201215	5.265	12:48	4.235	4.551	0.316		HydroSleeve	21.3	1.67	914	637	7.36	-90.4		Hydrocarbon smell	Clear,Black
15/12/2020	MW248	0089_MW248_201215	4.735	13:45	3.865	4.073	0.208	Shallow water. Bailer used	HandBailing	21.9	1.3	1922	1326	7.3	-6.6			Clear
15/12/2020	MW249	0089_MW249_201215	5.07	13:23	5.015	5.227	0.212	Sampled with bailer (water too shallow for hydrasleeve)	HandBailing	22.8	0.9	1098	741	7.33	-72.4			Clear
16/12/2020	MW255	0089_MW255_201216	6	11:38	4.18	4.609	0.429		HydroSleeve	23	3.72	662		0.34	-17.5			Clear
14/12/2020	MW256	0089_MW256_201214	6	13:52	3.4	3.84	0.44		HydroSleeve	20.5	2.17	1203		7.25	82.9			Clear
16/12/2020	MW257	0089_MW257_201216	5.7	11:20	3.39	3.806	0.416		HydroSleeve	23.3	5.24	3116		7.8	18.5			Clear
16/12/2020	MW258		6	11:06				Dry	HydroSleeve									Clear
16/12/2020	MW259	0089_MW259_201216	4	11:11	3.34	3.8	0.46		HydroSleeve	21.3	1.97	3068	1195.5	7.37	38.7			Clear
16/12/2020	MW261	0089_MW261_201216	4.72	11:33	3.6	3.858	0.258		HydroSleeve	20	1.54	2637	1859	7.39	-17.1		Hydrocarbon smell	Clear
14/12/2020	MW264	0089_MW264_201214	6	13:17	4.45	4.806	0.356		HydroSleeve	19.8	1.75	1227		7.49	51.3	Qc110/210		Clear
14/12/2020	MW268	0089_MW268_201214	5.5	12:31	2.87	4.056	1.186		HydroSleeve	21.7	1.22	8601		7.31	105			Clear
14/12/2020	MW269	0089_MW269_201214	5.5	12:41	3.98	4.153	0.173		HydroSleeve	21.5	2.91	1927		7.67	-31.2			Clear
14/12/2020	MW272	0089_MW272_201214	3.9	10:19	2.05	2.226	0.176		HydroSleeve	23.6	0.92	48180		7.42	24.4	qc106/qc206		Clear
15/12/2020	MW282	0089_MW282_201215	5.97	09:20	5.4	5.78	0.38		HydroSleeve	22.7	1.82	1198	812.5	6.96	3.2			Clear,Cloudy
15/12/2020	MW288	0089_MW288_201215	5.25	13:09				Dry	HydroSleeve									Clear

	15/12/2020	MW289	0089_MW289_201215	6.28	13:23	4.28	4.495	0.215		HydroSleeve	22.8	0.59	1763	1144	7.5	-9.2			Cloudy
	16/12/2020	MW516	0089_MW516_201216	6.93	10:56	6.155	6.369	0.214		HydroSleeve	22.8	1.14	1455	988	7.15	5			Clear
	15/12/2020	MW517	0089_MW517_201215	4.7	08:24	4.335	4.769	0.434		HydroSleeve	20.4	1.87	510	364	8.07	-28.3			Clear
	16/12/2020	MW518	0089_MW518_201216	6.5	11:20	5.25	5.545	0.295		HydroSleeve	20.2	1.05	2386	1553.5	7.6	46			Clear
	15/12/2020	PW304	0089_PW304_201215	0.2						Direct into bottle	27	0.51	44353		7.24	-271.4			Clear
	15/12/2020	PW306	0089_PW306_201215	0.2						Direct into bottle	23.7	0.71	55732		7.47	-228.6			Clear
	15/12/2020	PW307	0089_PW307_201215	0.3						Direct into bottle	22.8	2.5	55544		7.73	69.1			Clear
	15/12/2020	PW308	0089_PW308_201215	0.5						Direct into bottle	23.4	3.33	55712		7.88	625			Clear
	15/12/2020	PW314	0089_PW314_201215	0.1						Direct into bottle	25.7	1.56		55700	7.01	-312.9			Clear
EP2014090		PW315	0089_PW315_201215	0.4						Direct into bottle	23.9	0.83	56808		6.71	-250.1			Clear
	15/12/2020	PW316	0089_PW316_201215	0.4						Direct into bottle	23.4	3.22	56627		7.84	747			Cloudy
	14/12/2020	PW329	0089_PW329_201214	0.4						Direct into bottle	22	1.09	54407		7.61	-69.7	202/102		Clear
	14/12/2020	PW330	0089_PW330_201214	0.3						Direct into bottle	22.6	1.08	54711		7.67	-94.2		Sulfuric odour	Clear
	14/12/2020	PW331	0089_PW331_201214	0.4						Direct into bottle	21.2	1.33	55666		7.61	-78.6	104/204		Clear
	14/12/2020	PW335	0089_PW335_201214	0.4						Direct into bottle	21.9	0.53	52709	36465	7.48	-248.8	QC105, QC205		Clear
	14/12/2020	PW340	0089_PW340_201214	0.5						Direct into bottle	20.8	0.27	56509	36725	7.5	-213.3			Clear
	14/12/2020	PW341	0089_PW341_201214	0.2						Direct into bottle	21.7	0.85	56361	36660	6.99	-76.5			Clear
	15/12/2020	PW345	0089_PW345_201215	0.4						Direct into bottle	24.5	0.56	60970		6.93	-303.4			Clear
	15/12/2020	PW346	0089_PW346_201215	0.3						Direct into bottle	23.3	0.3	18731	12174.5	7.61	-224.8			Clear
	16/12/2020	PW350	0089_PW350_201216	0.3					labelled PW330 in CoC	Direct into bottle	22.5	1.52	57539		7.62	61.9			Clear
	16/12/2020	PW351	0089_PW351_201216	0.7						Direct into bottle	23.5	4.1	55060		7.91	60.3			Clear
	16/12/2020	PW352	0089_PW352_201216	0.6						Direct into bottle	21.3	5	54903		7.39	91.3			Clear
	14/12/2020	PW356	0089_PW356_201214	0.4						Direct into bottle	20.5	1.08	54535		7.37	-33.6			Clear
	14/12/2020	PW357	0089_PW357_201214	0.3						Direct into bottle	21.2	1.44	54899		7.67	-89.2			Clear
	14/12/2020	PW358	0089_PW358_201214	0.3						Direct into bottle	23.6	1.45	54471		7.63	-59			Clear
	14/12/2020	PW362	0089_PW362_201214	0.3						Direct into bottle	22.6	0.61	57404	37310	743	-141.6			Clear
	14/12/2020	PW363	0089_PW363_201214	0.4						Direct into bottle	213	451	24009	15606	755	920			Clear
	14/12/2020	PW364	0089_PW364_201214	0.4						Direct into bottle	21.9	1.33	52723	36400	7.71	-116.1		Salty	Clear
	15/12/2020	PW367	0089_PW367_201215	0.4						Direct into bottle	26.1	0.56	55209		7.16	-228.1			Clear
	15/12/2020	PW368	0089_PW368_201215	0.3					Labelled SW368 in CoC	Direct into bottle	23.6	2.04	47485		7.44	-258.5			Clear
	15/12/2020	PW369	0089_PW369_201215	0.4						Direct into bottle	24.2	0.65	56933		7.44	-238.5			Clear
	14/12/2020	PW374	0089_PW374_201214	0.3						Direct into bottle	22.3	3.67	57881		7.86	35.6			Clear
	14/12/2020	PW375	0089_PW375_201214	0.3						Direct into bottle	24	2.31	55851		7.78	-8.8	Qc 109, qc 209		Clear
	14/12/2020	PW378	0089_PW378_201214	0.4						Direct into bottle	24.8	1.41	54510		7.76	-86.6			Clear
	16/12/2020	PW380	0089_PW380_201216	0.6						Direct into bottle	23.4	4.6	55051	5815	7.93	60.3			Clear
	16/12/2020	PW381	0089_PW381_201216	0.7						Direct into bottle	22.6	3.35	56056		7.92	60.7			Clear
	16/12/2020	PW401	0089_PW401_201216	0.8						Direct into bottle	22.5	3.3	56682	36855	7.45	65.9			Clear
	15/12/2020	PW405	0089_PW405_201215	0.3						Direct into bottle	22.1	0.58	56353		7.61	-152.9			Clear
	15/12/2020	PW407	0089_PW407_201215	0.2						Direct into bottle	24.3	0.46	58616		7.55	-131.7			Clear
	15/12/2020	PW409	0089_PW409_201215	0.4						Direct into bottle	22.4	0.41	56691	36885	7.65	-137.3			Clear
	15/12/2020	PW411	0089_PW411_201215	0.3						Direct into bottle	23.6	0.85	56869	36985	7.73	-109.8			Clear
	15/12/2020	PW413	0089_PW413_201215	0.4						Direct into bottle	22.9	0.44	56487	36725	7.7	-158.1			Clear
	15/12/2020	PW415	0089_PW415_201215	0.2						Direct into bottle	23.7	0.99	57175	37180	7.66	-25.3			Clear

Date	Sample ID	Monitoring Site ID	Sampling Method	Sample Depth (m)	WaterBody Depth (m)	Comments ?	T (oC)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Colour	Turbidity
14/12/2020	0089_SW130_201214	SW130	Direct into Bottle	0.1	1.2		21.9	3.62	52321	36140	8.05	-66.6	Clear	Low
14/12/2020	0089_SW132_201214	SW132	Direct into Bottle	0.1	0.6	QC107 / QC207 SW taken here	21.2	4.71	56632	36790	8.02	15.5	Clear	Low
14/12/2020	0089_SW134_201214	SW134	Direct into Bottle	0.1	0.5		21.9	4.15	56544	36790	7.98	-40.1	Clear	Low
14/12/2020	0089_SW150_201214	SW150	Direct into Bottle	0.4	0.3		22.1	4.72	8.03		8.03	48	Clear	Low
14/12/2020	0089_SW152_201214	SW152	Direct into Bottle	0.2	0.8		23.4	4.95	55960		8.02	135.4	Clear	Low
14/12/2020	0089_SW154_201214	SW154	Direct into Bottle	0.1	0.6		23.4	5.54	55380		8.05	34.5	Clear	Low
14/12/2020	0089_SW156_201214	SW156	Direct into Bottle	0.2	0.5		23.6	3.43	55331		8.04	49.5	Clear	Low
15/12/2020	0089_SW305_201215	SW305	Direct into Bottle	0.6	1		26.2	5.78	54290		8.17	-120	Clear	Low
15/12/2020	0089_SW309_201215	SW309	Direct into Bottle	0.2	0.8	Qc112/212	23.9	0.04	56055		7.44	-284.6	Clear	Medium
15/12/2020	0089_SW310_201215	SW310	Direct into Bottle	0.1	0.3		23.4	3.42	55586		7.91	-213.3	Clear	Medium
15/12/2020	0089_SW311_201215	SW311	Direct into Bottle	0.3	0.5		23.2	4.98	55470		8.07	65	Clear	Low
14/12/2020	0089_SW317_201214	SW317	Direct into Bottle	0.3	0.9		24.5	4.02	55238		8.11	-11.7	Clear	Low
14/12/2020	0089_SW318201214	SW318	Direct into Bottle	0.2	0.9		22.7	4.86	54887		8.14	23.8	Clear	Low
14/12/2020	0089_SW319_201214	SW319	Direct into Bottle	0.1	0.4	Qc111/211	20.8	3.93	55164		8.15	53.4	Clear	Low
16/12/2020	0089_SW353_201216	SW353	Direct into Bottle	0.1	0.3		22.2	4.58	55317	35919	7.48	74.4	Clear	Low
15/12/2020	0089_SW370_201215	SW370	Direct into Bottle	0.2	0.7		27.1	4.17	55292		7.91	-194.4	Clear	Low
15/12/2020	0089_SW371_201215	SW371	Direct into Bottle	0.2	0.6		27.7	3.69	53972		8.34	-126.3	Clear	Medium
15/12/2020	0089_SW372_201215	SW372	Direct into Bottle	0.1	0.3		23.7	4.87	55961	36400	8.24	12.8	Clear	Low
15/12/2020	0089_SW373_201215	SW373	Direct into Bottle	0.1	0.3		24.1	5.75	54728	35555	8.05	-18.5	Clear	Low
16/12/2020	0089_SW382_201216	SW382	Direct into Bottle	0.1	0.3	labelled PW382 in CoC	21.6	4.61	55161	35514	8.14	80.1	Clear	Low
16/12/2020	0089_SW383_201216	SW383	Direct into Bottle	0.1	0.4		21.9	4.71	55319	35742	8.15	76.1	Clear	Low
16/12/2020	0089_SW384_201216	SW384	Direct into Bottle	0.1	0.4		22.5	4.23	55381	35010	8.13	70.5	Clear	Low
15/12/2020	0089_SW406_201215	SW406	Direct into Bottle	0.1	0.2	labelled SW446 in CoC	22	4.84	54808		7.9	-65.4	Clear	Low
15/12/2020	0089_SW408_201215	SW408	Direct into Bottle	0.2	0.5		19.8	4.85	53676		7.97	77	Clear	Low
15/12/2020	0089_SW410_201215	SW410	Direct into Bottle	0.2	0.3		20.4	4.3	55888	36335	8	38.3	Clear	Low
15/12/2020	0089_SW412_201215	SW412	Direct into Bottle	0.3	0.5		24.4	4.33	55088	35815	8.09	39.9	Clear	Low
15/12/2020	0089_SW414_201215	SW414	Direct into Bottle	0.2	0.4		24.9	3.77	56119	36465	8.1	23.8	Clear	Low
15/12/2020	0089_SW416_201215	SW416	Direct into Bottle	0.1	0.3		24.9	4.14	56798	36920	8.14	19.9	Clear	Low

Date	Sample ID	Monitoring Site ID	Sampling Method	Comments ?	Depth of Sediment Sampling (m)	Matrix Description
15/12/2020	0089_SD304_201215	SD304	Direct into Bottle		0.5	Sand, coarse, white
15/12/2020	0089_SD306_201215	SD306	Direct into Bottle		0.5	Sand, coarse, grey
15/12/2020	0089_SD307_201215	SD307	Direct into Bottle		0.3	Sand, coarse, yellow
15/12/2020	0089_SD308_201215	SD308	Direct into Bottle		0.5	Sand, white
15/12/2020	0089_SD314_201215	SD314	Direct into Bottle		0.5	Sand, coarse, grey
15/12/2020	0089_SD315_201215	SD315	Direct into Bottle		0.5	Sand, white
15/12/2020	0089_SD316_201215	SD316	Direct into Bottle		0.4	Sand, white
14/12/2020	0089_SD329_201214	SD329	Direct into Bottle	Qc101/qc201	0.4	Sand, coarse, grey
14/12/2020	0089_SD331_201214	SD331	Direct into Bottle	Qc103/203	0.5	Sand, coarse, grey
14/12/2020	0089_SD335_201214	SD335	Direct into Bottle		0.4	Sand, coarse
14/12/2020	0089_SD340_201214	SD340	Shovel Trowel		0.3	Sand, white
14/12/2020	0089_SD341_201214	SD341	Shovel Trowel		0.2	Sand, coarse
15/12/2020	0089_SD345_201215	SD345	Direct into Bottle		0.4	Sand, coarse, grey
15/12/2020	0089_SD346_201215	SD346	Shovel Trowel		0.3	Sand, white
16/12/2020	0089_SD350_201216	SD350	Shovel Trowel		0.3	Sand, coarse
16/12/2020	0089_SD351_201216	SD351	Direct into Bottle		0.7	Sand, white
16/12/2020	0089_SD352_201216	SD352	Direct into Bottle		0.5	Sand, coarse, white
16/12/2020	0089_SD352_201216	SD352	Shovel Trowel		0.5	Sand, yellow
14/12/2020	0089_SD356_201214	SD356	Direct into Bottle		0.5	Sand, coarse, grey
14/12/2020	0089_SD357_201214	SD357	Direct into Bottle		0.5	Sand, white
14/12/2020	0089_SD362_201214	SD362	Shovel Trowel		0.3	Sand, grey
14/12/2020	0089_SD363_201214	SD363	Shovel Trowel		0.3	Sand, coarse, grey
14/12/2020	0089_SD364_201214	SD364	Direct into Bottle		0.4	Sand, coarse
15/12/2020	0089_SD367_201215	SD367	Direct into Bottle		0.5	Sand, white
15/12/2020	0089_SD368_201215	SD368	Direct into Bottle		0.4	Sand, white
15/12/2020	0089_SD369_201215	SD369	Direct into Bottle		0.4	Sand, grey
14/12/2020	0089_SD374_201214	SD374	Direct into Bottle		0.5	Sand, coarse, yellow
14/12/2020	0089_SD375_201214	SD375	Direct into Bottle		0.5	Sand, white
14/12/2020	0089_SD378_201214	SD378	Direct into Bottle		0.4	Sand, coarse, grey
16/12/2020	0089_SD380_201216	SD380	Shovel Trowel		0.5	Sand, coarse, white
16/12/2020	0089_SD381_201216	SD381	Shovel Trowel		0.5	Sand, white
16/12/2020	0089_SD381_201216	SD381	Shovel Trowel		0.6	Sand, yellow
16/12/2020	0089_SD401_201216	SD401	Shovel Trowel		0.8	Sand, white
15/12/2020	0089_SD405_201215	SD405	Direct into Bottle		0.5	Sand, yellow
15/12/2020	0089_SD407_201215	SD407	Direct into Bottle		0.2	Sand, coarse, white
15/12/2020	0089_SD409_201215	SD409	Shovel Trowel		0.3	Sand, white
15/12/2020	0089_SD411_201215	SD411	Shovel Trowel		0.3	Sand, grey
15/12/2020	0089_SD413_201215	SD413	Shovel Trowel		0.2	Sand, coarse, white
15/12/2020	0089_SD415_201215	SD415	Shovel Trowel		0.3	Sand, white

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20K104050
Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	176.10 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV -4 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature		Room Temp	26.6	0	°C	NA	26.6	°C
pH	pH 7.00	356684	7.01	-6.80	mV	7.13	7.01	pH
pH	pH 4.00	355385	4.00	169.30	mV	4.12	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.05	2717	2764	µs/cm
ORP (Reference check only)	Zobell A & B	335411/335412	225	225	mV	226.8	229.9	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	0.9	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	6.73	uA	103.5	100.0	%

Calibrated by: [redacted]

Calibration Date: 11-Dec-20
Next Due: 09-Jun-21

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20H100322
Cable length: 4m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	176.00 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV -4 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature		Room Temp	26.3	0	°C	NA	26.3	°C
pH	pH 7.00	356684	7.01	-18.20	mV	7.11	7.01	pH
pH	pH 4.00	355385	4.00	157.80	mV	4.13	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.17	2756	2764	µs/cm
ORP (Reference check only)	Zobell A & B	335411/335412	226	226	mV	226.9	230.3	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	-1.1	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	6.11	uA	89.7	100.0	%

Calibrated by: [redacted]

Calibration Date: 09-Dec-20
Next Due: 07-Jun-21

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 19L102399
Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	174.40 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV -4 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature		Room Temp	26.5	0	°C	NA	26.5	°C
pH	pH 7.00	356684	7.01	-21.60	mV	7.07	7.01	pH
pH	pH 4.00	355385	4.00	152.80	mV	4.09	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.04	2829	2764	µs/cm
ORP (Reference check only)	Zobell A & B	335411/335412	226	226	mV	226.1	230.1	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	0.3	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	8.16	uA	127	100.0	%

Calibrated by: [redacted]

Calibration Date: 11-Dec-20
Next Due: 09-Jun-21

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 16F102589
Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	175.20 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV -4 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature		Room Temp	26.5	0	°C	NA	26.5	°C
pH	pH 7.00	356684	7.01	-12.10	mV	7.08	7.01	pH
pH	pH 4.00	355385	4.00	163.10	mV	4.1	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.02	2793	2764	µs/cm
ORP (Reference check only)	Zobell A & B	335411/335412	226	226	mV	225.8	230.1	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	-1.2	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	6.79	uA	121.7	100.0	%

Calibrated by: [redacted]

Calibration Date: 09-Dec-20
Next Due: 07-Jun-21

Equipment Check Report

Water Level/Drawdown Meter

Customer: Cardno
Contact: [redacted]

Manufacturer: Heron
Instrument: Dipper T2
Serial #: 122010008JH
Cable length: 60m

Item	Test	Pass	Comments
Battery	Voltage (9v battery)	✓	Voltage above 7.9 V
	Capacity	✓	
Probe	Decontaminated	✓	
	Condition	✓	
	Operation	✓	
Connectors	Condition	✓	
Tape Check	Condition	✓	Good, no tears
	Decontaminated	✓	
Instrument Test	Water level mode	✓	
	Drawdown mode	✓	
Speaker	Operation	✓	

Comments

NA

This is to certify that the above instrument has been checked and is in good working order.

Checked by: [redacted]

Check Date 11-Dec-20
Next Due: 09-Jun-21

Equipment Check Report

Oil/Water Interface Meter

Customer: Cardno
Contact: [redacted]

Manufacturer: Heron
Instrument: H.OIL
Serial #: 162006055EC
Cable length: 60m

Item	Test	Pass	Comments
Battery	Voltage (9v battery)	✓	Voltage above 7.9 V
	Capacity	✓	
Probe	Decontaminated	✓	
	Condition	✓	
	Operation	✓	
Connectors	Condition	✓	
Tape Check	Condition	✓	Good, no tears
	Decontaminated	✓	
Instrument Test	Water level mode	✓	
	Interface mode	✓	
Speaker	Operation	✓	

Comments

NA

This is to certify that the above instrument has been checked and is in good working order.

Checked by: [redacted]

Check Date 11-Dec-20
Next Due: 10-Jan-21

Equipment Check Report

Water Level/Drawdown Meter

Customer: Cardno
Contact: [redacted]

Manufacturer: QED
Instrument: MP30
Serial #: 1658
Cable length: 45m

Item	Test	Pass	Comments
Battery	Voltage (9v battery)	✓	Voltage above 7.9 V
	Capacity	✓	
Probe	Decontaminated	✓	
	Condition	✓	
	Operation	✓	
Connectors	Condition	✓	
Tape Check	Condition	✓	Good, no tears
	Decontaminated	✓	
Instrument Test	Water level mode	✓	
	Drawdown mode	✓	
Speaker	Operation	✓	

Comments

NA

This is to certify that the above instrument has been checked and is in good working order.

Checked by: [redacted]

Check Date 11-Dec-20
Next Due: 09-Jun-21

Equipment Check Report

Water Level/Drawdown Meter

Customer: Cardno
Contact: [redacted]

Manufacturer: QED
Instrument: MP30
Serial #: 1672
Cable length: 45m

Item	Test	Pass	Comments
Battery	Voltage (9v battery)	✓	Voltage above 7.9 V
	Capacity	✓	
Probe	Decontaminated	✓	
	Condition	✓	
	Operation	✓	
Connectors	Condition	✓	
Tape Check	Condition	✓	Good, no tears
	Decontaminated	✓	
Instrument Test	Water level mode	✓	
	Drawdown mode	✓	
Speaker	Operation	✓	

Comments

NA

This is to certify that the above instrument has been checked and is in good working order.

Checked by: [redacted]

Check Date 11-Dec-20
Next Due: 09-Jun-21

APPENDIX

E

DATA QUALITY REVIEW

Data Quality Review
PFAS Ongoing Monitoring Plan Quarterly Monitoring Factual Report

This appendix reviews the Quality Assurance (QA) and Quality Control (QC) documentation. Quality assurance encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation should also include an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples submitted such as field blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

QA/QC Aspects	Evidence & Evaluation
	QA Documentation
Project Quality Plan/Work Plan and Data Quality Objectives	The field investigation was carried out between the 14 December 2020 and 16 December 2020 and is in accordance with the proposed scope of work, as documented in the SAQP (ref DEF19009_ HMAS_Stirling_SAQP_Rev3) issued to the client and in general compliance with the Australian standards AS 4482.1-2005 "*Guide to Sampling and Investigation of Potentially Contaminated Soil, Part 1: Non-volatile and Semi-volatile Compounds",* Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling* and NEPM "*National Environment Protection (Assessment of Site Contamination) Measure".* A quality control program was implemented during the Investigation and the quality assurance procedures used have been reiterated in the report (DEF19009_2020 Q4 OMP Factual Report_HMAS Stirling). In addition, a Health, Safety and Environment Work Method Statement (HSEWMS) was also prepared. The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.
	Data Representativeness
Use of Composites	No Composites were used during the investigation
Holding Times	Chain of custody and laboratory reports provide evidence of holding times. Holding times were generally compliant with required timeframes. with the exception of the following: **Groundwater/porewater/surface water:** • EP2013973, EP2013975, EP2013983, EP2013984, EP2013985, EP2013988, EP2013989, EP2013992, EP2014041, EP2014042, EP2014044, EP2014047, EP2014051, EP2014053, EP2014087, EP2014090, EP2014092, EP2014104: o pH – 3 to 14 days overdue The holding time exceedances for a pH are not considered to have adversely impacted the reliability of the results obtained, or the conclusions drawn from this assessment. **Sediment:** No holding time non-compliance was reported for the sediment samples.
Background samples	No background samples were collected as part of this investigation.
Verification of field procedures	The methodology conducted during this investigation is documented in the body of the report, and was in general conformance with the SAQP.

<table>
<tr><th>QA/QC Aspects</th><th>Evidence & Evaluation</th></tr>
<tr><td></td><td>Non-disposable equipment was decontaminated between sample locations.</td></tr>
<tr><td colspan="2">Data Precision & Accuracy</td></tr>
<tr><td>QC sample Frequency</td><td>
<table>
<tr><th>QC sample type</th><th>SAQP required frequency</th><th>Sample Collected</th></tr>
<tr><td>Blind duplicate</td><td>1 in 10 primary water samples (10%)
1 in 20 primary sediment samples (5%)</td><td>14 for 125 primary water samples (11.2%)
2 for 39 primary sediment samples (5.1%)</td></tr>
<tr><td>Split duplicate</td><td>1 in 10 primary water samples (10%)
1 in 20 primary sediment samples (5%)</td><td>14 for 125 primary water samples (11.2%)
2 for 39 primary sediment samples (5.1%)</td></tr>
<tr><td>Rinsate</td><td>1 per day / equipment used</td><td>10 (4xequipment for 2 days and 2x equipment for 1 days) (100%)</td></tr>
<tr><td>Field Blank</td><td>1 per day / field team (esky)</td><td>9 (3x field teams for 2 days and 2x samplers for 1 day) (100%)</td></tr>
</table>
QC sample frequency was compliant with the SAQP for water and sediment duplicates, rinsates and field blanks.</td></tr>
<tr><td>QC Testing – Blind Replicates (Primary Lab)</td><td>
▪ Relative Percentage Difference (RPD) Acceptance Criteria:
<table>
<tr><th>Magnitude of Results</th><th>Acceptable RPD range</th></tr>
<tr><td>< 10 x LOR</td><td>No limits</td></tr>
<tr><td>10 – 20 LOR</td><td>0% - 50%</td></tr>
<tr><td>> 20 x LOR</td><td>0% - 20%</td></tr>
</table>
Groundwater, Porewater & Surface water
▪ Number of Samples Analysed: 139 (including QC)
▪ Duplicate Samples Analysed: 14
Sediment
▪ Number of Samples Analysed: 41 (including QC)
▪ Duplicate Samples Analysed: 2
The level of RPD is generally minor and probably related to the low analyte concentrations of analyte pairs.</td></tr>
<tr><td>QC Testing – Field Splits (Secondary Lab)</td><td>
▪ Relative Percentage Difference (RPD) Acceptance Criteria:
<table>
<tr><th>Magnitude of Results</th><th>Acceptable RPD range</th></tr>
<tr><td>< 10 x LOR</td><td>No limits</td></tr>
<tr><td>10 – 20 LOR</td><td>0% - 50%</td></tr>
<tr><td>> 20 x LOR</td><td>0% - 20%</td></tr>
</table>
Groundwater, Porewater & Surface water
▪ Number of Samples Analysed: 139 (including QC)
▪ Field Split Samples Analysed: 14
Sediment
▪ Number of Samples Analysed: 41 (including QC)
▪ Field Split Samples Analysed: 2
The level of RPD is generally minor and probably related to the low analyte concentrations of analyte pairs and/or difference of methodologies between the primary and secondary laboratories.</td></tr>
<tr><td>Field Blanks</td><td>Field Blanks were collected at a rate of one per field team (esky) per fieldwork day. All field blank samples tested reported analytes below the laboratory limit of reporting.</td></tr>
</table>

QA/QC Aspects	Evidence & Evaluation
Laboratory Internal QC	Evidence of the laboratories internal QC testing is present and complete in the reports. ALS (Primary) performed internal QC with adequate testing and satisfactory results for method blank, laboratory control samples and laboratory duplicates. All Matrix Spikes generally reported recoveries within the acceptance range of 70% to 130% with the exception of the following: ▪ EP2013973, EP2013975: - Water sample PFOS matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2013984, EP2013985, EP2013988, EP2013989, EP2013992, EP2014044, EP2014047, EP2014051, EP2014053, EP2014092: - Water sample sulfate and chloride matrix spike recoveries were not determined due to the background concentrations exceeding 4x spike level. All Laboratory Duplicate sample RPDs were within the acceptable criteria with exception of the following: ▪ EP2013975, EP2013985, EP2013988, EP2013989, EP2014106 - Water sample suspended solids duplicate RPD exceeded the LOR based limit. All Quality Control sample frequencies were of an acceptable rate with exception of the following: ▪ EP2013975, EP2013983, EP2013984, EP2013985, EP2013988, EP2013989, EP2013992, EP2014044, EP2014047, EP2014051, EP2014053, EP2014087, EP2014090, EP2014092, EP2014104, EP2014106: - Matrix Spikes and Lab duplicates for PFAS were undertaken less than the target rate. ▪ EP2014041, EP2014042: - Lab duplicates for PFAS were undertaken less than the target rate.
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were generally lower than the respective assessment criteria.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature. ALS Accreditation No. 825 Eurofins Accreditation No. 1261
Calibration of Field Equipment	All equipment used during the investigation was calibrated by the supplier prior to use. The equipment calibration certificates are provided in Appendix D.
Decontamination and Equipment Blanks	Rinsate blanks were collected at a rate of one per day when reusable equipment is used (i.e. YSI, dipper, pore water sampler...). All rinsate samples tested reported analytes concentrations below the laboratory LORs.
	Data Comparability
Standard Procedures	Fieldwork procedures are detailed in the SAQP and reports and are comparable for each phase of Investigation.
Qualified Personnel	Staff involved in managing and reviewing the project and those involved in fieldwork are qualified personnel.
Sample Integrity	Field Chain of Custody/Laboratory request forms can be found in Appendix C.
	Data Completeness
Completeness of test program	The scope of work undertaken was generally consistent with the SAQP.

QA/QC Aspects	Evidence & Evaluation
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection process for groundwater and therefore, the data set used as the basis for groundwater investigation is considered valid and complete.

APPENDIX

F

INFORMATION ABOUT ENVIRONMENTAL REPORTS

About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- A factual report of the condition of a portion of the site or one aspect of an entire site.
- Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- Validation of the success of remediation of a site or a portion of a site.
- Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide "environmental sign-off" of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants' duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the "hot spot" method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as “residential – low density”, “commercial” etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

The ESA Report is prepared in a manner that can be easily read by a lay person with a legitimate interest in the contamination status of the site, such as the site owner or occupier, EPA and Local Planning Authority. The ESA report is not intended for use by other parties or for other purposes. Anyone who uses the assessment report for purposes other than specified in the report, does so at their own risk.

The site should only be used for one or more of the beneficial uses and land uses identified in the ESA as suitable.

The conditions and qualifications may apply to the suitability of the site for use, and it is the responsibility of the Client to be cognizant of and accept these in accepting the report. Cardno are only responsible for the issuing of the ESA report but accepts no liability for the costs incurred in the implementation of ESA findings.

The ESA provides a “snapshot” of the site conditions at the time of the site investigation. Consequently, the report may not be valid at a later time if there has been any change to the contamination status of the site in that time. Verification of the status of the site may be required in cases where a significant time has elapsed, or site conditions have changed since the assessment and audit.

The ESA is necessarily limited by constraints such as time, cost and available information; although normal professional practice at the time has been applied with all due care to prepare the report. A necessary requirement of this process is the horizontal and vertical interpolation of data from discrete locations. However, site conditions are generally not homogenous and some discrepancies will occur between the actual and predicted results at locations not directly sampled. There is a risk that contamination may occur at the site and not be identified by a competent investigation and assessment. The approach adopted in sampling (a combination of statistically based grid and judgmental sampling) seeks to reduce, but cannot eliminate, this risk.

Where unexpected occurrences of contamination arise, subsequent to the issue of the ESA Report, Cardno should be permitted to make an interpretation of these facts in relation to the ESA Report findings. Consequently, the Client should inform Cardno and seek their opinion. Cardno accepts no liability for costs incurred due to such

unexpected occurrences, given the inherent uncertainties in the assessment process.

Cardno uses information provided by other parties as the basis for the ESA, and reliance on this information is at the discretion of Cardno. However, however Cardno cannot guarantee any of the facts, findings or conclusions presented by other parties. Cardno will not be liable for the use of information, provided by others that is subsequently found to be intentionally misleading.

The ESA Report is not and does not purport to be anything other than a contaminated land ESA. It is not a geotechnical report and bore logs reproduced are for interpretation of the likely distribution of contamination. They are not intended for geotechnical interpretations and may not be adequate for this purpose.

The ESA Report is not intended to be a comprehensive analysis of the presence and associated risk of asbestos in buildings and services. Where asbestos in buildings and services is known or likely, the report may only caution that an appropriately qualified person be engaged to undertake demolition to avoid contamination of the site.

Cardno

13 August 2015

PFAS OMP Quarterly Sampling Event Factual Report

March 2021

HMAS Stirling

DEF19009

Prepared for
Department of Defence

15 June 2021

Cardno®

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2	15/06/2021	Rev 2	[redacted]	[redacted]

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

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Chemical Names

DOC	Dissolved Organic Carbon
DO	Dissolved Oxygen
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Per-fluoro-hexane Sulphonate
PFOA	Per-fluoro-octanoic Acid
PFOS	Per-fluoro-octane Sulfonate
TDS	Total Dissolved Solids (salinity of water)
TOC	Total Organic Carbon
TSS	Total Suspended Solids

Technical Terms

AFFF	Aqueous Film-Forming Foam
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
BGL	Below Ground Level
CEC	Cation Exchange Capacity
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
RWL	Reduced water levels
SAQP	Sampling and Analysis Quality Plan
SWL	Standing water level

Units

ha	Hectares
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

OMP	Ongoing Monitoring Plan
FTG	Fire Training Ground
HSF	Helicopter Support Facility

1 Introduction

1.1 Background

Cardno was engaged by the Australian Department of Defence ("the Client") to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) at HMAS Stirling ("the site"). The site is located on Garden Island, Western Australia and is displayed in Figure 1 of Appendix A.

The OMP was carried out in accordance with the scope and limitations presented in Cardno's Sampling and Analysis Quality Plan (SAQP):

> Cardno, 18 August 2020, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) HMAS Stirling'.

The SAQP was reviewed prior to the monitoring event and the following changes were made:

> Update to the OMP groundwater monitoring locations table (MW516, MW517 and MW518 in replacement of MW247, MW250 and MW260 respectively).

> Time of groundwater gauging and equipment (YSI) daily bump tests to be recorded on field records.

For the purposes of this report:

> The Management Area was defined as comprising of Garden Island and the marine nearshore environment (Figure 1, Appendix A).

1.2 Purpose & Objectives

The objective of the OMP is to assess the changes in the nature and extent of PFAS within the environment, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor associated with Defence's historical use of legacy Aqueous Film Forming Foam (AFFF).

The purpose of this PFAS OMP factual report is to provide an up-to-date status of the condition of the site as it is currently understood in relation to the most recent sampling event.

The objectives of the report are:

> To provide a succinct summary of the Q1 2021 sampling event and provision of analytical results with supporting tables and figures.

> To provide confirmation of the current understanding of risk.

> To provide supporting data for the assessment of management actions, where relevant.

1.3 Relevant Guidelines

This assessment has been undertaken in general accordance with applicable industry standards for a site investigation for the purpose, objectives and scope identified in this report. These standards are set out in:

> National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013) (ASC NEPM).

> Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, PFAS National Environmental Management Plan (NEMP) 2.0.

> Australian Standard AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds.

> Standards Australia 1998. AS/NZ 5667:1998 Water quality – sampling.

> Australian and New Zealand Guidelines, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

- Department of Environment and Regulation (DER), 2014, Assessment and Management of Contaminated Sites[1].
- Department of Defence, Department of Energy, 2018, Quality System Manual Schedule B15.
- U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
- USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.
- National Health and Medical Research Council (NHMRC), August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.

2 Scope of Work

Cardno carried out the tasks detailed in the following sections in order to satisfy the purpose and objectives of this assessment.

2.1 Groundwater Monitoring

Sampling of selected groundwater bores was performed in accordance with the SAQP (Cardno, 2020), applying methods set out in section 3 of this report. The groundwater bores monitored as part of the OMP are presented in Table 2-1, and are shown on Figure 2, Appendix A.

Table 2-1 Groundwater Monitoring Locations

Monitoring Area	Location ID
Demolition Ground	MW137, MW139, MW141, MW142, MW147, MW149, MW272
Fire Training Area	MW109, MW112, MW117, MW120, MW121, MW123, MW124, MW125, MW126, MW127, MW128
WWTP	MW158, MW161, MW166, MW171, MW172, MW173, MW193, MW195D, MW195S, MW196, MW197, MW199, MW200, MW202, MW203,
Accommodation Area	MW288, MW289
Dredge Spoil / Careening Bay	MW264, MW268, MW269
AVCAT Storage and Fuel Farm	MW233, MW236, MW238, MW239, MW240, MW242, MW243, MW245, MW516, MW248, MW249
Fire Station, Flammable / Hazardous Goods and Waste Storage, Ship Sullage	MW255, MW256, MW257, MW258, MW259, MW261, MW517, MW518, MW010
Helicopter Support Facility	MW214, MW215, MW216, MW217, MW220, MW224, MW225, MW226, MW227, MW228, MW282

2.2 Porewater, Surface Water and Sediment Monitoring

Porewater, sediment and surface water sampling were performed in accordance with the SAQP (Cardno, 2019), applying methods set out in section 3 of this report. The porewater, surface water and sediment monitoring locations monitored as part of the OMP are presented in Table 2-2, and are shown on Figures 3 to 5, Appendix A.

[1] It is noted that Site is located on Commonwealth Land and is regulated under the Commonwealth environmental legislation, the State based DWER guidelines are relevant for the sampling of off-Site private properties and waterways.

Table 2-2 Porewater, Surface Water and Sediment Monitoring Locations

Monitoring Area	Porewater Sampling Location ID	Sediment Sampling Location ID	Surface Water Sampling Location ID
Demolition Ground	PW329, PW330, PW331, PW356, PW357, PW358	SD329, SD330, SD331, SD356, SD357, SD358	SW150, SW152, SW154, SW156
Fire Training Area	PW335, PW340, PW341, PW362, PW363, PW364	SD335, SD340, SD341, SD362, SD363, SD364	SW130, SW132, SW134
WWTP	PW304, PW345, PW367, PW368, PW369, PW350, PW351, PW352, PW380, PW381, PW401	SD304, SD345, SD367, SD368, SD369, SD350, SD351, SD352, SD380, SD381, SD401	SW305, SW370, SW371, SW372, SW373, SW353, SW382, SW383, SW384
Accommodation Area	PW346	SD346	
Dredge Spoil / Careening Bay	PW374, PW375, PW378	SD374, SD375, SD378	SW317, SW318, SW319
Helicopter Support Facility	PW306, PW307, PW308, PW314, PW315, PW316, PW405, PW407, PW409, PW411, PW413, PW415	SD306, SD307, SD308, SD314, SD315, SD316, SD405, SD407, SD409, SD411, SD413, SD415	SW309, SW310, SW311, SW406, SW408, SW410, SW412, SW414, SW416

2.3 Data Management

All the data included in the report has been collected, uploaded to the ESdat database and reviewed according to the data management requirements of the DCMM Annex L.

The sample naming convention detailed in the DCMM Annex L was used in the field.

2.3.1 Defence ESdat database

Data collected as part of the Q1 2021 OMP monitoring event was uploaded to the ESdat database according to the data management requirements of the DCMM Annex L, including:

- All field data collected was uploaded;
- Laboratory data was uploaded and approved; and
- QA/QC data was reconciled.

2.4 Deviations from the OMP SAQP

Deviations from the SAQP for the Q1 2021 monitoring event are presented in Table 2-3 below.

Table 2-3 Deviations from OMP SAQP

Location	Deviation	Comments
MW128, MW147, MW172, MW196, MW214, MW215, MW220, MW225	Not sampled	These wells were found dry during this monitoring event.
MW258, MW199	Not Sampled	Monitoring well blocked (assumed with tree roots).
MW173, MW193, MW197, MW236, MW248, MW288	Sampled with disposable HPDE bailer	The hydrasleeve didn't fill up during recovery

3 Methodology

3.1 Groundwater Sampling Methodology

Groundwater monitoring was undertaken by no purge HydraSleeve® method as detailed in Table 3-1.

Table 3-1 Groundwater Sampling Methodology

Activity	Details
Well Gauging	Standing Water Level (SWL) were gauged using an interface probe. All wells were measured against a specified mark at the top of the well casing. Time of gauging was recorded on field records sheets.
Groundwater Field Parameters	Groundwater field parameters were recorded via a down-hole water quality meter (positioned within the mid screen interval) prior to deployment of HydraSleeves® or pre-sample collection. The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Once field parameters have stabilised (as indicated by at least three consecutive measurements falling within +/- 10% of each other) measurement were recorded on field data records. All field instruments (e.g. water quality meter) were calibrated by the equipment supplier and bump tested daily to optimise the accuracy of the measurements taken. Calibration certificates and bump test records are provided in Appendix D.
Deployment of HydraSleeve	HydraSleeve were deployed with top weight for sample collection to begin at the lowest point. Following sampling, hydrasleeves were deployed in preparation for the next OMP monitoring event using the same string for consistency (same depth of sampling i.e. within screen depth).
Retrieval of HydraSleeves (Sample Collection)	HydraSleeve sampling devices were left in wells for a minimum of 12 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples were collected via continuous pull method at a rate allowing the water to pass through the check value into the sample sleeve. Samples were discharged immediately (minimise changes in chemistry) via discharge tube.
Hand bailing (alternative sampling method)	Disposable HDPE hand bailers, attached to a polypropylene string, were used at wells where the water column wasn't sufficient to fill the hydrasleeve. Purging of the well was undertaken prior to sampling to make sure that a sample representative of the aquifer is taken (i.e. removal of 3x well volume). A sample was collected once field parameters had stabilised.
Decontamination procedure	Dedicated HydraSleeves were used at each groundwater bore thus removing the need for decontamination. All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate). Where holding times did not comply, this is discussed in the data quality review in Appendix E.
Quality Control	Groundwater QC samples were collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples.

Activity	Details
	▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples sent to a secondary laboratory.
Laboratory Testing	Groundwater samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance). ▪ Total Organic carbon (TOC), total suspended solids (TSS), total dissolved solids (TDS) and pH. The primary laboratory was ALS Global Laboratories (Perth), and the secondary laboratory (quality control) was Eurofins (Perth). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.

3.2 Porewater and Sediment Sampling Methodology

The methodologies for sediment and porewater sampling are detailed in Table 3-2 and Table 3-3 respectively.

Table 3-2 Sediment Sampling Methodology

Item	Details
Sample Collection	Sediment samples were collected at the sediment/water interface using hand tools (e.g. trowel, hand auger, PVC pipe etc.) with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under CoC documentation.
Field Parameters	At each sampling location, the sediment sample was visually assessed and observations (including physical description) were recorded on field data sheets.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Quality Control	Sediment QC samples were collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples greater than 1 per 20 primary samples. ▪ Field triplicate (inter-laboratory) samples greater than 1 per 20 primary samples sent to a secondary laboratory.
Laboratory Testing	Sediment samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ TOC, EC, CEC and pH

Table 3-3 Porewater Sampling Methodology

Item	Detail
Porewater Sample Collection	Porewater sampling was undertaken in accordance with the USEPA guidance *Operating Procedure Pore Water Sampling*. Porewater was purged and sampled at less than 1 L per minute using a peristaltic pump, connected to a stainless steel tube with a screened section at its base (Drive-Point Piezometer). The porewater sampler was inserted to at least 1 m below the surficial marine sediments, to ensure collection of pore water rather than surface water. Tubing was replaced at each sampling location to prevent cross-contamination.
Field parameters	The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.

Item	Detail
Sample identification, preservation, transport and holding times.	As detailed in Table 3-1.
Quality Control	Porewater QC samples were collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples sent to a secondary laboratory.
Laboratory Testing	Porewater samples were submitted for the same analysis as groundwater samples (refer to Table 3-1).

3.3 Surface Water Sampling Methodology

The methodology for the surface water monitoring is detailed in Table 3-4.

Table 3-4 Surface water Sampling Methodology

Item	Details
Field parameters	The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Field observations such as odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Surface water samples were collected directly into sample containers using a 'Grab' (manual) sample method via a long-handled sampling device. The sample container was positioned 10 cm below the surface water level and above the sediment bed and oriented with the capped opening facing downwards to avoid the collection of surface films. Samples were decanted into the laboratory supplied sample containers. Samples were collected in accordance with Australian/New Zealand Standards (AS/NZS 5667.1:1998) '*Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*'.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation, transport and holding times.	As detailed in Table 3-1.
Quality Control	Surface water QC samples were collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples sent to a secondary laboratory.
Laboratory Testing	Surface water samples were submitted for the same analysis as groundwater samples (refer to Table 3-1).

3.4 Quality Control / Quality Assurance

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following data quality indicators, as described in the SAQP:

> QA documentation.

- Bias.
- Data Representativeness.
- Data Precision & Accuracy.
- Laboratory Performance.
- Data Comparability.
- Data Set Completeness.

A detailed review of these aspects has been undertaken, the results of which are presented in Appendix E. The QA/QC review concluded that there are no significant systematic errors in the data collection process and therefore, the dataset used for the assessment is considered valid and complete.

3.5 Assessment Criteria

3.5.1 Groundwater, Porewater and Surface Water

The adopted assessment criteria for groundwater, porewater and surface water are detailed in Table 3-5.

Table 3-5 Criteria for Groundwater, Porewater and Surface Water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	µg/L		
Human Health - Drinking Water Quality Guideline	0.07[1]	0.56	HEPA 2020
Human Health – Recreational Water	2[1]	10	NHMRC 2019
Ecological – 99% species protection	0.00023[2]	19	HEPA 2020

Notes:

1. Sum of PFOS and PFHxS.
2. PFOS only; The criterion of 0.00023 µg/L is lower than the laboratory level of reporting (LOR), however, the PFAS NEMP 2020 allows for the adoption of the laboratory LOR as a screening level rather than a quantified measurement.

3.5.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment. Sediment will be assessed against the NEMP (HEPA, 2020) soil criteria for consistency with the SAQP (Cardno, 2020), DSI (RPS, 2018b) and ERA (RPS, 2018c). The adopted assessment criteria for sediments are detailed in Table 3-6.

Table 3-6 Criteria for Sediment

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	mg/kg		
Human Health - Commercial / industrial (on-base activities)	20[1]	50	HEPA 2020
Ecological - Open space – direct exposure (interim guidelines)	1[2]	10	HEPA 2020
Ecological - Industrial /Commercial – indirect exposure (interim guidelines) (on site)	0.01[2]	-	HEPA 2020

Notes:

1. Sum of PFOS and PFHxS.
2. PFOS only

4 Field Observations and Results

4.1 General Site Observations

No weather event or Site activities that could have impacted the sampling or results obtained were observed.

4.2 Groundwater

4.2.1 Summary of Field Observations

4.2.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the groundwater sampling event are presented in field sampling record sheets, included in Appendix D. Parameters were generally consistent with the previous monitoring event. Groundwater pH was near neutral, water was mostly clear and fresh to saline. Groundwater temperature ranged from 18.9°C (MW233) to 26.8°C (MW193). DO readings mostly indicate aerobic groundwater conditions. EC readings ranged from 534 µS/cm (MW112) to 58,883 µS/cm (MW272) and indicate fresh to saline groundwater conditions. No visual or olfactory evidence of contamination were recorded.

4.2.1.2 Groundwater Elevation and Migration

Groundwater gauging data and reduced water levels (RWL) are provided within the field records in Appendix D. The groundwater elevations ranged between -0.601 mAHD (MW216) and 0.989 mAHD (MW120). It is expected that groundwater levels and migration are locally and temporally influenced by the tides.

Gauging data recorded within 0.3m of the low tide point was used to infer the groundwater migration contours in discreet areas of the site (Figure 3, Appendix A). Groundwater flow was interpreted to be radial from the site (i.e. groundwater flows towards the ocean), which is consistent with the previous monitoring events. Groundwater inferred elevation contours for the 2021 Q1 monitoring event are shown in Figure 6, Appendix A.

4.2.2 Groundwater Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-1. Laboratory results have also been compared to available historical data. Figure 2 in Appendix A presents the groundwater monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-1 Summary of Groundwater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	MW112, MW117, MW121, MW141, MW173, MW193, MW236, MW282,	0.56[2]	7.28 (MW282)	59	8
Sum of PFHxS and PFOS	MW010, MW166, MW109, MW112, MW117, MW120, MW121, MW123, MW125, MW141, MW142, MW161, MW171, MW173, MW193, MW202, MW216, MW233, MW236, MW240, MW248, MW249, MW255, MW256, MW259, MW261, MW264, MW268, MW269, MW282, MW288, MW289, MW516	0.07[2]	94 (MW282)	59	33
PFOS	MW166, MW010, MW109, MW112, MW117, MW120, MW121, MW123, MW141, MW142, MW161, MW171, MW173, MW193, MW202, MW216, MW217, MW233, MW236, MW242, MW243, MW245, MW248, MW249, MW255, MW256, MW259, MW264, MW269, MW282, MW288, MW289, MW516, MW517	0.01[3]	53.4 (MW236)	59	34

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria

Notes:
1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – drinking water
3. LOR adopted instead of HEPA (2020) guideline value for ecological – 99% species protection

Findings are summarised as follows:

> There were no new exceedances of the adopted assessment criteria or first-time detections of PFOA or Sum of PFOS and PFHxS for any of the groundwater samples collected in Q1 2021.

4.3 Porewater

4.3.1 Summary of Field Observations

4.3.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the porewater sampling program are presented in field sampling record sheets, included in Appendix D. Parameters were generally consistent with the previous monitoring event. Porewater pH was near neutral, with a temperature oscillating between 20°C and 30°C (mean=24.2°C). Water was clear and EC/TDS readings indicate saline to hypersaline porewater conditions. DO readings mostly indicate aerobic porewater conditions. No visual or olfactory evidence of contamination were recorded.

4.3.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-1. Laboratory results have also been compared to available historical data. Figure 4 in Appendix A presents the porewater monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-2 Summary of Porewater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	0.56[2]	<0.01	39	0
Sum of PFHxS and PFOS	PW335, PW340, PW346, PW362,	0.07[2]	0.28 (PW340)	39	4
PFOS	PW304, PW308, PW335, PW340, PW341, PW345, PW346, PW350, PW351, PW362, PW363, PW364, PW367, PW368, PW374, PW375, PW378	0.01[3]	0.28 (PW340)	39	17

Notes:
1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – drinking water
3. LOR adopted instead of HEPA (2020) guideline value for ecological – 99% species protection

Findings are summarised as follows:

> Three porewater sampling locations (PW335, PW340, PW362) reported a first exceedance of the drinking water criteria (0.07 ug/L) for Sum of PFOS and PFHxS.

> No first time detection of PFOA or Sum of PFOS and PFHxS was reported for the porewater samples in Q1 2021.

4.4 Surface Water

4.4.1 Summary of Field Observations

4.4.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the surface water sampling program are presented in field sampling record sheets, included in Appendix D. Parameters were generally consistent with the previous monitoring event. Surface water pH was near neutral, temperature was 24.5°C on average, water was clear and EC readings (average of 56,287 µS/cm) indicate hyper-saline conditions. DO readings indicate aerobic surface water conditions. No visual or olfactory evidence of contamination were recorded.

4.4.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-1. Laboratory results have also been compared to available historical data. Figure 3 in Appendix A presents the surface water monitoring locations where a first time detection of Sum of PFOS and PFHxS or PFOA or a new exceedance of guideline values were reported. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-3 Summary of surface water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	0.56[2]	<0.01	28	0
Sum of PFHxS and PFOS	SW305, SW371	0.07[2]	0.40 (SW305)	28	2
PFOS	SW130, SW132, SW134, SW305, SW370, SW371, SW372, SW373, SW406, SW414	0.01[3]	0.37 (SW305)	28	10

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – drinking water
3. LOR adopted instead of HEPA (2020) guideline value for ecological – 99% species protection

Findings are summarised as follows:

> Two surface water sampling locations (SW406, SW414) reported first time detects of PFOS above the laboratory LOR and therefore an exceedance of the ecological criteria. These two locations also reported a first time detect of Sum of PFOS and PFHxS.

4.5 Sediment

4.5.1 Summary of Field Observations

Observations recorded during the sediment sampling program are provided in the field sampling record sheets within Appendix D.

4.5.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. Soil criteria are adopted in the absence of criteria for sediment for consistency with the SAQP (Cardno, 2020), DSI (RPS, 2018b) and ERA (RPS, 2018c). A summary of results is presented in Table 4-4. Laboratory results have also been compared to available historical data. Figure 5 in Appendix A presents the sediment monitoring locations. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-4 Summary of Sediment Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (mg/kg)	Max Conc. (mg/kg)	No. Analytical Results[4]	No. Results Above Criteria
PFOA	-	10[1]	<0.0002	39	0
Sum of PFHxS and PFOS	-	20[3]	0.0017 (SD346)	39	0
PFOS	-	0.01[2]	0.0017 (SD346)	39	0

Notes:

1. Ecosystems – open space – direct exposure
2. Ecological - indirect exposure
3. Human health – comm/industrial
4. Non-inclusive of quality control samples

Findings are summarised as follows:

- No exceedance of the adopted assessment criteria was reported for the sediment sampling locations during the Q1 2021 sampling event.
- Two sediment sampling locations (SD335, SD362) reported a first time detect of Sum of PFOS and PFHxS above the laboratory LOR but below the human health and ecological criteria.

4.6 Changes to the Monitoring Network Condition

The following changes to the monitoring network were observed:

- Monitoring bores MW258 and MW199 were found to be blocked (assumed tree roots). It is recommended that these bores are repaired prior to the next sampling event.

No other change to the monitoring condition that could have impacted the data integrity was recorded since Q4 2020.

5 Summary and Conclusions

Cardno undertook the 2021 Q1 groundwater, porewater, surface water and sediment monitoring event at HMAS Stirling as part of the PFAS OMP. Groundwater sampling and testing was undertaken at 59 monitoring bores, 28 surface water locations and 39 sediment and porewater sampling locations. Ten monitoring wells could not be sampled as the wells were found dry (8) or were blocked (2).

Groundwater levels were gauged in all wells before sampling. Groundwater flow was interpreted to be radial from the site where mounding of groundwater is occurring (i.e. groundwater flows towards the ocean), consistent with the previous monitoring event.

The groundwater laboratory results reported the following:

- Of the 59 samples that were tested, PFOA (8 samples), PFOS (34 samples) and Sum of PFHxS and PFOS (33 samples) reported concentrations that exceeded adopted assessment criteria.
- There were no new exceedances of the adopted assessment criteria or first-time detections of PFOA or Sum of PFOS and PFHxS for any of the groundwater samples collected in Q1 2021.

The surface water laboratory results reported the following:

- Of the 28 samples tested, PFOS (10 samples) was detected above the adopted ecological 99% species protection criteria and Sum of PFHxS and PFOS (2 samples) reported concentrations that exceeded the drinking water criteria.
- Two surface water sampling locations (SW406, SW414) reported first time detects of PFOS above the laboratory LOR and therefore an exceedance of the ecological criteria. These two locations also reported a first time detect of Sum of PFOS and PFHxS.

The porewater laboratory results reported the following:

- Of the 39 samples that were tested, PFOS (17 samples) and Sum of PFOS and PFHxS (4 sample) reported concentrations above adopted assessment criteria.
- Three porewater sampling locations (PW335, PW340, PW362) reported a first exceedance of the drinking water criteria (0.07 ug/L) for Sum of PFOS and PFHxS.
- No first time detection of PFOA or Sum of PFOS and PFHxS was reported for the porewater samples in Q1 2021.

The sediment laboratory results reported the following:

- Of the 39 samples that were tested, no sampling locations reported concentrations above adopted assessment criteria.
- Two sediment sampling locations (SD335, SD362) reported a first time detect of Sum of PFOS and PFHxS above the laboratory LOR but below the human health and ecological criteria.

The following actions will be undertaken during the next sampling event:

- Replacement of the missing bore cap at MW126; and
- Attempt to re-instate MW258 and MW199 currently obstructed with tree roots, with the help of a steel bailer.

The next OMP sampling event for HMAS Stirling will be the quarterly monitoring event (Q2 2021), scheduled for June 2021. An Annual Interpretive Report will be prepared following the September 2021 monitoring event for the 2020 –2021 reporting period.

6 References

General References

1. Australian Standard AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 – Non-volatile and semi-volatile compounds.
2. Australian Standard AS 4482-1999 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 2 – Volatile substances.
3. Australian Water Quality Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ, 2000).
4. *Contaminated Sites Act 2003*, Western Australia.
5. Department of the Environment and Energy (2017) in the National Greenhouse and Energy Reporting Scheme Measurement Technical Guidelines for the Estimation of Emissions by Facilities in Australia.
6. Department of Environment Regulation (DER), 2014, *Assessment and Management of Contaminated Sites*.
7. Department of Water and Environment Regulation (DWER), 2018, Perth Groundwater Atlas, (https://maps.water.wa.gov.au/#/webmap/gwm).
8. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, '*Guidance on Environmental Data Verification and Data Validation'.*
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10. National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended), registered May 2013.
11. National Health and Medical Research Council (NHMRC) (2011 – updated 2018) National Water Quality Management Strategy Australian Drinking Water Guidelines 6, August 2018
12. NHMRC, August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.
13. Standards Australia/Standards New Zealand (1998) AS5667.1:1998 *'Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples'*.
14. U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
15. USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.

Site Specific References

16. Department of Defence, January 2019, HMAS Stirling Garden Island PFAS Management Area Plan, Final.
17. Cardno, 18 August 2020, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) HMAS Stirling'.
18. Cardno, 16 April 2020, PFAS OMP 2019 Q4 Quarterly Monitoring Factual Report, HMAS Stirling
19. Cardno, 14 May 2020, PFAS OMP 2020 Q1 Quarterly Sampling Event Factual Report, HMAS Stirling
20. Cardno, 23 September 2020, PFAS OMP 2020 Q2 Quarterly Sampling Event Factual Report, HMAS Stirling
21. Cardno, 22 January 2021, PFAS OMP 2020 Q3 Quarterly Sampling Event Factual Report, HMAS Stirling
22. Cardno, March 2021, PFAS OMP 2020 Q4 Quarterly Sampling Event DRAFT Factual Report, HMAS Stirling
23. RPS, October 2018, HMAS Stirling - PFAS Ongoing Monitoring Plan, Ref. EEC16094.005 (RPS, 2018a).
24. RPS, May 2018, Detailed Site Investigation – HMAS Stirling PFAS Investigation, Ref. EEC16094.003 (RPS, 2018b).
25. RPS, September 2018, HMAS Stirling Garden Island PFAS Investigation Ecological Risk Assessment. Ref. EEC16094.009 (RPS, 2018c).

APPENDIX A

FIGURES

FIGURE 1

1:32,000 Scale at A3

Meters

0 500 1,000

Site Location

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-06-07 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-001_RegionalLocation 02.mxd
Aerial Imagery Supplied by Google Map

FIGURE 1B

1:32,000 Scale at A3

Meters

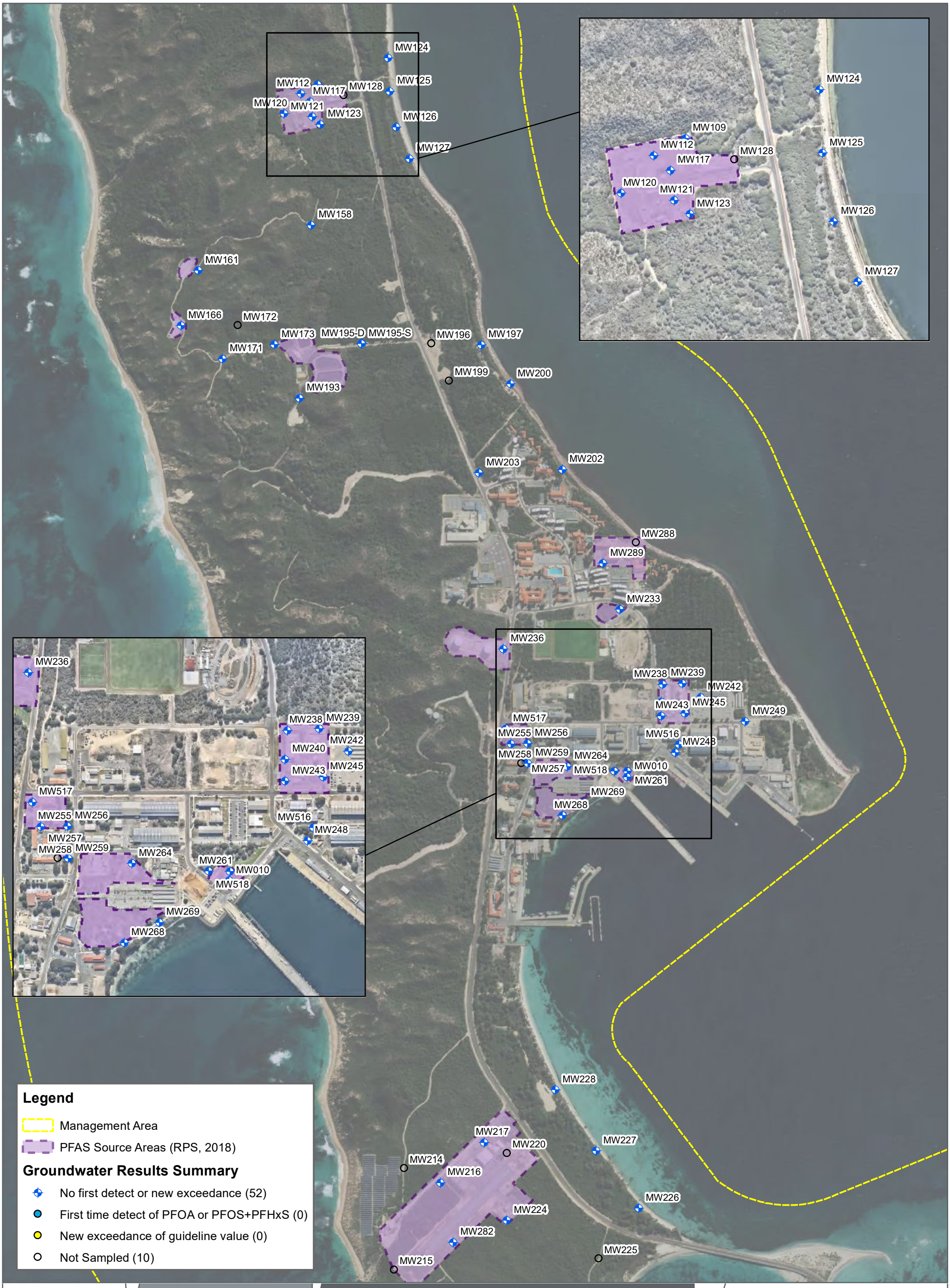
0 500 1,000

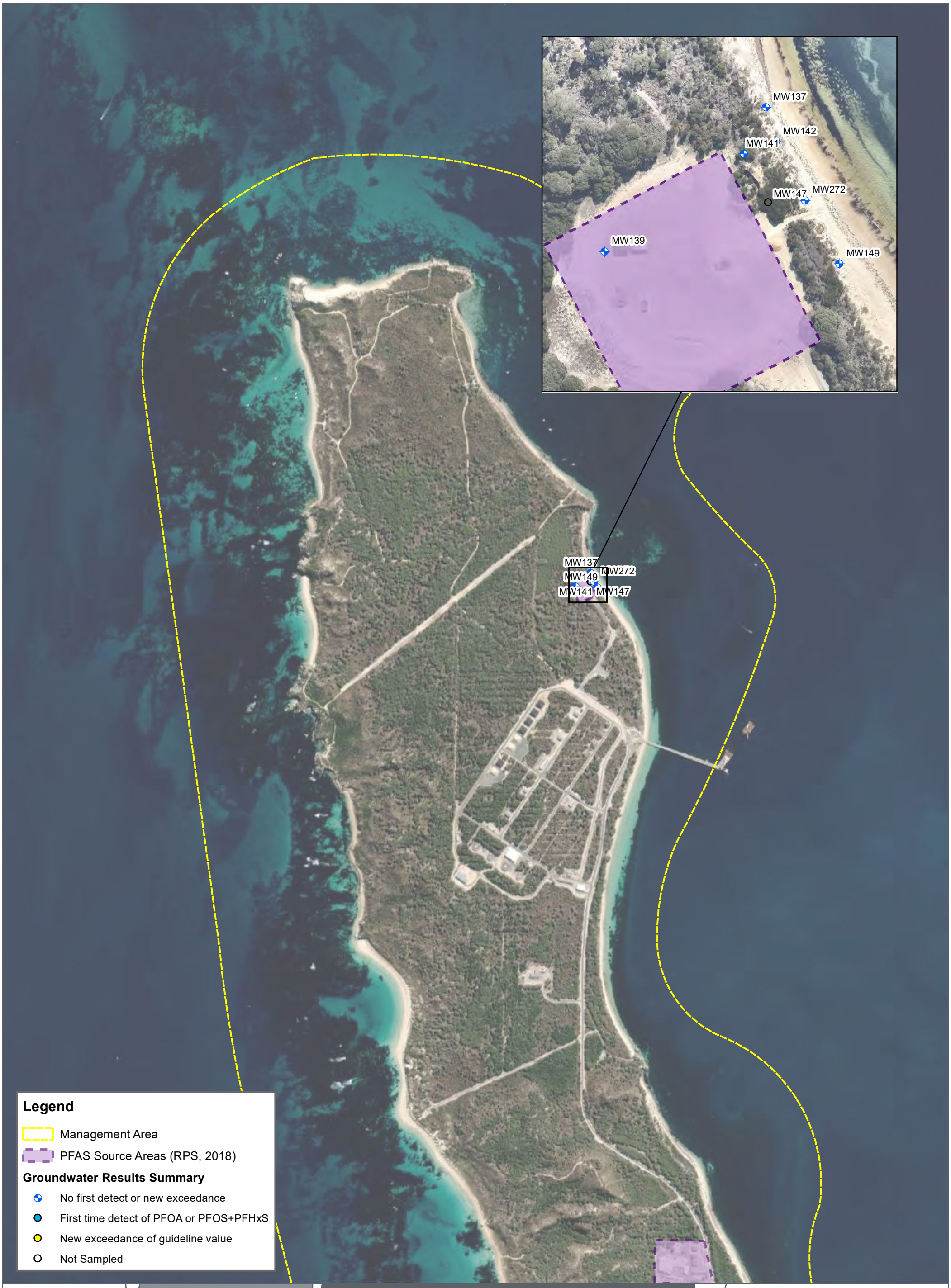
Management Area

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-001B_ManagementArea 02.mxd
Aerial Imagery Supplied by Google Earth & Nearmap


MW124
MW112
MW117
MW128
MW125
MW120
MW121
MW123
MW126
MW127
MW158
MW161
MW166
MW172
MW173
MW195-D
MW195-S
MW196
MW197
MW171
MW199
MW200
MW193
MW203
MW202
MW288
MW289
MW233
MW236
MW238
MW239
MW242
MW240
MW243
MW245
MW517
MW255
MW256
MW516
MW248
MW257
MW258
MW259
MW264
MW261
MW010
MW518
MW269
MW268
MW109
MW249
MW228
MW217
MW220
MW227
MW214
MW216
MW226
MW224
MW282
MW225
MW215
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Groundwater Results Summary
No first detect or new exceedance (52)
First time detect of PFOA or PFOS+PFHxS (0)
New exceedance of guideline value (0)
Not Sampled (10)
FIGURE 2A
1:12,500 Scale at A3
Meters
0
300
600
Groundwater Results
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-002A_2021Q1_GWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap


MW137
MW142
MW141
MW147
MW272
MW139
MW149
MW137
MW272
MW149
MW141
MW147
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Groundwater Results Summary
No first detect or new exceedance
First time detect of PFOA or PFOS+PFHxS
New exceedance of guideline value
Not Sampled
FIGURE 2B
1:15,000 Scale at A3
Meters
0
250
500
Groundwater Results
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-002B_2021Q1_GWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

Notes:
99%SP: Ecological criteria for 99% species protection (HEPA, 2020)

SW130
SW132
SW134
SW353
SW384
SW383
SW382
SW370
SW371
SW372
SW373
SW305
SW317
SW318
SW319
SW406
SW408
SW410
SW412
SW414
SW416
SW309
SW310
SW311

SW406
PFOS>99%SP

SW414
PFOS>99%SP

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

Surface Water Results Summary

- No first time detect or new exceedance (22)
- First time detect of PFOA or PFOS+PFHxS (0)
- New exceedance of guideline value (2)

FIGURE 3A
1:15,000 Scale at A3
Meters
0 300 600

Surface water Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003A_2021Q1_SWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

SW150
SW152
SW154
SW156
SW154
SW156
SW152
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Surface Water Results Summary
No first time detect or new exceedance
First time detect of PFOA or PFOS+PFHxS
New exceedance of guideline value
FIGURE 3B
1:15,000 Scale at A3
Meters
0
300
600
Surface water Results
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003B_2021Q1_SWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

Notes:
DW: Human Health criteria for Drinking Water quality (HEPA, 2020)

PW335
PFOS+PFHxS>DW

PW340
PFOS+PFHxS>DW

PW362
PFOS+PFHxS>DW

PW335
PW364
PW362
PW340
PW341
PW363
PW350
PW401
PW380
PW351
PW381
PW352
PW369
PW345
PW367
PW368
PW304
PW346
PW314
PW315
PW306
PW307
PW316
PW308
PW378
PW375
PW374
PW405
PW407
PW409
PW411
PW413
PW415
PW306
PW315
PW316
PW308
PW307

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

Pore water Results Summary

- No first detect or new exceedance (30)
- First time detect of PFOA or PFOS+PFHxS (0)
- New exceedance of guideline value (3)

FIGURE 4A

1:15,000 Scale at A3

Meters

0 300 600

Porewater Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-004A_2021Q1_PWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

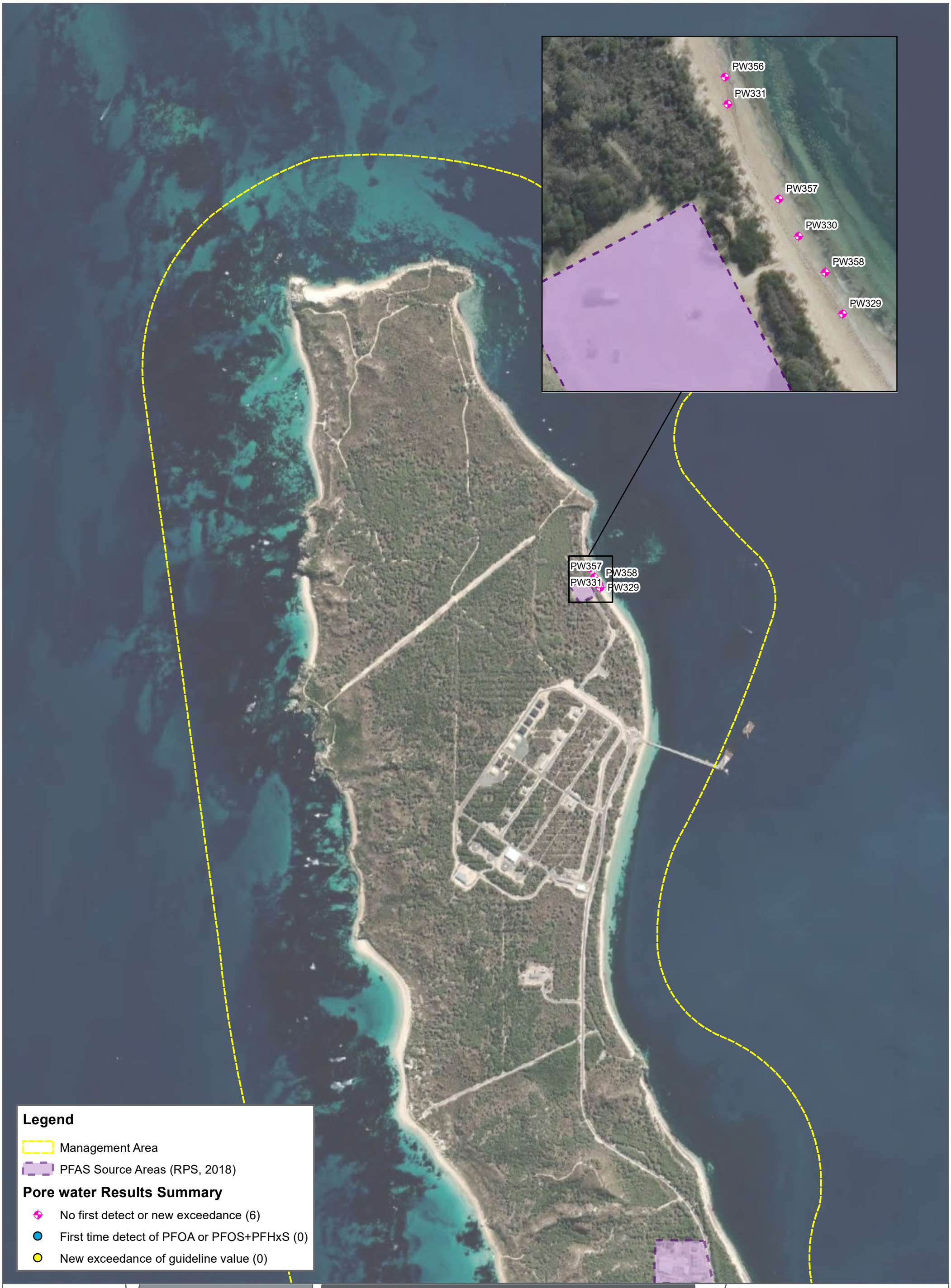

PW356
PW331
PW357
PW330
PW358
PW329
PW357
PW358
PW331
PW329
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Pore water Results Summary
No first detect or new exceedance (6)
First time detect of PFOA or PFOS+PFHxS (0)
New exceedance of guideline value (0)
FIGURE 4B
1:15,000 Scale at A3
Meters
0
300
600
Porewater Results
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-004B_2021Q1_PWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

FIGURE 5A

1:15,000 Scale at A3

Meters

0 300 600

Sediment Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-005A_2021Q1_SDResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

SD356
SD331
SD357
SD330
SD358
SD329
SD357
SD358
SD330
SD329
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Sediment Results Summary
No first detect or new exceedance (6)
First time detect of PFOA or PFOS+PFHxS (0)
New exceedance of guideline value (0)
FIGURE 5B
1:15,000 Scale at A3
Meters
0
300
600
Sediment Results
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-005B_2021Q1_SDResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

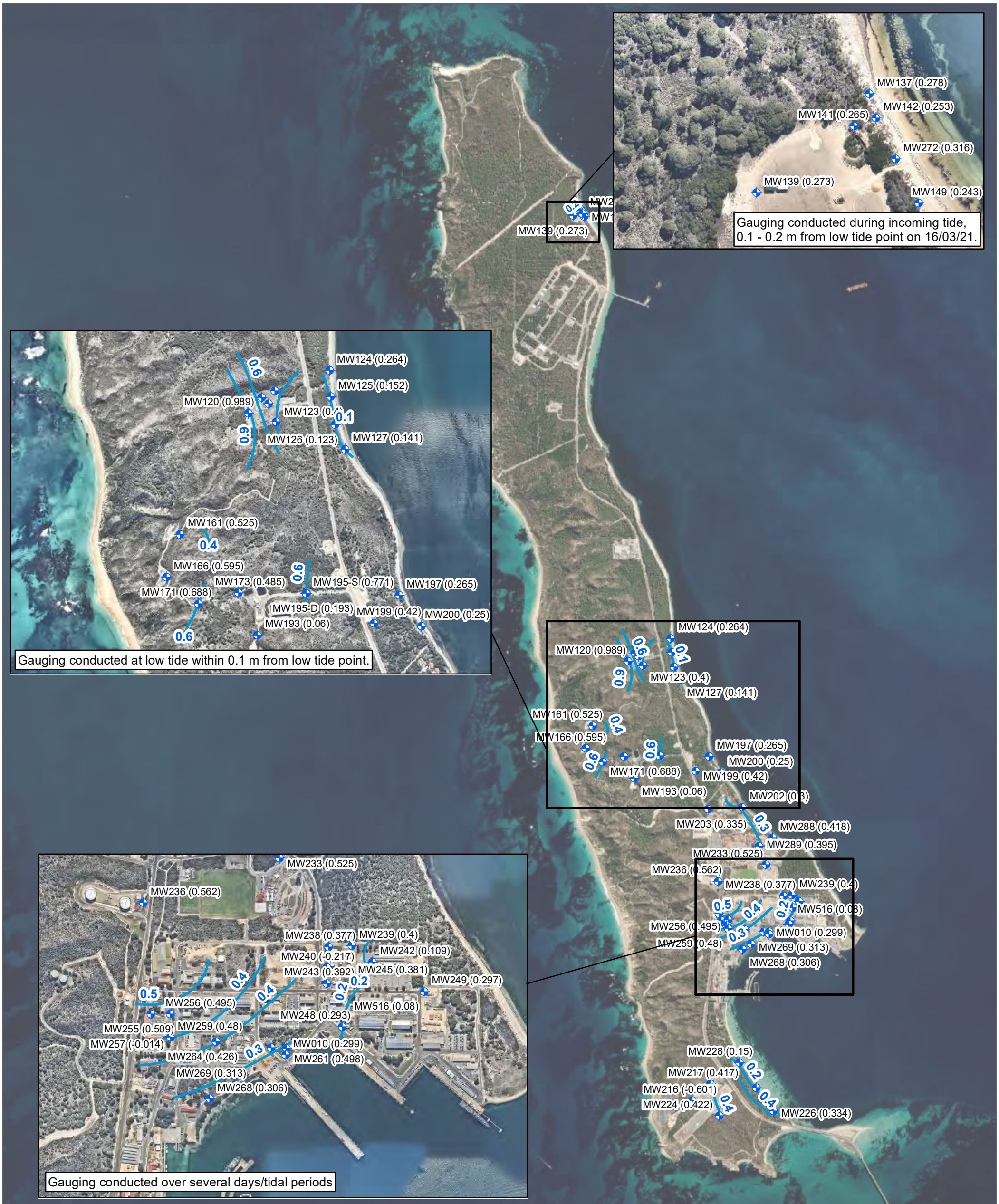


FIGURE 6

1:32,000 Scale at A3

Meters

0 500 1,000

Inferred Groundwater Contours

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-06-12 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-06_2021Q1_GroundwaterContours 03.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

APPENDIX

B

DATA ASSESSMENT TABLES

Table 1: Water Analytical Results

					PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - Fluorotelomer Sulfonic Acids				PFAS - Perfl		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of reporting					0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.02	0.05	0.02
Human Health - Drinking Water Quality Guideline															*0.56*													
Human Health – Recreational Water															**10**													
Ecological – 99% species protection									LOR*						19													
Monitoring Area	**Lab Report Number**	**Field ID**	**Location Code**	**Date**																								
	EP2102752	**0089_MW127_210315**	**MW166**	**15/03/2021**	0.03	0.03	0.74	0.15	8.40	<0.02	<0.1	0.24	0.26	0.12	0.08	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102954	**0089_MW010_210318**	**MW010**	**18/03/2021**	<0.02	<0.02	0.06	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102833	**0089_MW109_210316**	**MW109**	**16/03/2021**	0.34	0.58	3.64	0.22	3.72	<0.02	<0.1	0.62	0.10	0.06	0.18	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102833	**0089_MW112_210316**	**MW112**	**16/03/2021**	0.17	1.52	36.6	5.00	14.4	<0.02	0.2	3.59	0.56	0.64	*4.28*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.15	<0.05	<0.05	0.14	<0.05	<0.02
	EP2102833	**0089_MW117_210316**	**MW117**	**16/03/2021**	0.57	1.35	13.0	2.18	25.0	<0.02	0.2	3.62	0.66	0.36	*1.11*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102833	**0089_MW120_210316**	**MW120**	**16/03/2021**	0.03	0.05	3.33	0.46	3.81	<0.02	<0.1	0.15	0.03	<0.02	0.20	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102833	**0089_MW121_210316**	**MW121**	**16/03/2021**	0.64	1.53	17.7	2.35	29.3	<0.02	0.2	2.16	0.40	0.31	*1.18*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.14	<0.05	<0.05	0.32	<0.05	<0.02
	EP2102833	**0089_MW123_210316**	**MW123**	**16/03/2021**	0.11	0.08	0.48	<0.02	0.05	<0.02	<0.1	0.47	0.13	0.03	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_MW124_210315**	**MW124**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_MW125_210315**	**MW125**	**15/03/2021**	0.14	0.12	0.43	<0.02	<0.01	<0.02	<0.1	0.11	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_MW126_210315**	**MW126**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_MW127_210315**	**MW127**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102837	**0089_MW137_210316**	**MW137**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102837	**0089_MW139_210316**	**MW139**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102837	**0089_MW141_210316**	**MW141**	**16/03/2021**	0.43	0.79	8.10	1.06	31.0	<0.02	0.2	5.86	0.69	0.23	*0.78*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102837	**0089_MW142_210316**	**MW142**	**16/03/2021**	0.06	0.13	3.70	0.11	3.13	<0.02	<0.1	1.49	0.15	0.04	0.22	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102836	**0089_MW149_210316**	**MW149**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_MW158_210315**	**MW158**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_MW161_210315**	**MW161**	**15/03/2021**	0.05	0.05	0.81	0.11	7.16	<0.02	<0.1	0.17	0.21	0.06	0.08	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_MW171_210315**	**MW171**	**15/03/2021**	0.07	0.03	0.15	<0.02	0.03	<0.02	<0.1	0.08	0.04	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102833	**0089_MW173_210316**	**MW173**	**16/03/2021**	0.30	0.32	4.02	0.74	3.97	<0.02	<0.1	0.69	0.27	0.18	*0.63*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.13	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102833	**0089_MW193_210316**	**MW193**	**16/03/2021**	1.22	1.29	10.0	0.70	2.08	<0.02	0.3	2.44	0.52	0.24	*0.62*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102833	**0089_MW195D_210316**	**MW195D**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102833	**0089_MW195S_210316**	**MW195S**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102833	**0089_MW197_210316**	**MW197**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102833	**0089_MW200_210316**	**MW200**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102755	**0089_MW202_210315**	**MW202**	**15/03/2021**	<0.02	<0.02	0.03	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102837	**0089_MW203_210316**	**MW203**	**16/03/2021**	<0.02	0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102955	**0089_MW216_210318**	**MW216**	**18/03/2021**	0.34	0.41	3.75	0.11	0.55	<0.02	0.9	2.07	2.88	0.33	0.30	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	2.17	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102955	**0089_MW217_210318**	**MW217**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.9	3.14	2.56	0.62	0.30	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	28.5	0.34	<0.05	<0.02	<0.05	<0.02
	EP2102955	**0089_MW224_210318**	**MW224**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102900	**0089_MW226_210317**	**MW226**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_MW227_210315**	**MW227**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_MW228_210315**	**MW228**	**15/03/2021**	0.10	0.04	0.03	<0.02	<0.01	<0.02	2.0	8.86	9.40	1.16	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102755	**0089_MW233_210315**	**MW233**	**15/03/2021**	<0.02	<0.02	0.10	<0.02	0.11	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102833	**0089_MW236_210316**	**MW236**	**16/03/2021**	0.45	1.28	17.8	0.66	53.4	<0.02	0.1	1.72	0.25	0.50	*1.24*	<0.02	<0.02	3.15	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102955	**0089_MW238_210318**	**MW238**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102954	**0089_MW239_210318**	**MW239**	**18/03/2021**	0.04	0.07	0.04	<0.02	<0.01	<0.02	<0.1	0.08	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102954	**0089_MW240_210318**	**MW240**	**18/03/2021**	0.02	0.08	3.26	0.20	<0.01	<0.02	<0.1	0.18	0.02	0.03	0.30	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102954	**0089_MW242_210318**	**MW242**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102955	**0089_MW243_210318**	**MW243**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102955	**0089_MW245_210318**	**MW245**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102954	**0089_MW248_210318**	**MW248**	**18/03/2021**	0.15	0.12	1.34	0.05	0.44	<0.02	0.8	0.30	0.04	0.05	0.10	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102755	**0089_MW249_210315**	**MW249**	**15/03/2021**	<0.02	<0.02	0.11	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102900	**0089_MW255_210317**	**MW255**	**17/03/2021**	0.10	0.07	1.05	<0.02	0.65	<0.02	<0.1	0.19	0.04	0.03	0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102900	**0089_MW256_210317**	**MW256**	**17/03/2021**	0.25	0.32	3.65	0.29	6.55	<0.02	<0.1	1.38	0.34	0.12	0.29	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.21	<0.05	<0.05	0.03	<0.05	<0.02
	EP2102954	**0089_MW257_210318**	**MW257**	**18/03/2021**	<0.02	<0.02	0.06	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102954	**0089_MW259_210318**	**MW259**	**18/03/2021**	0.02	0.02	0.08	<0.02	0.36	<0.02	<0.1	0.13	0.07	0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102954	**0089_MW261_210318**	**MW261**	**18/03/2021**	0.03	<0.02	0.26	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102954	**0089_MW264_210318**	**MW264**	**18/03/2021**	<0.02	<0.02	0.05	<0.02	1.30	<0.02	<0.1	0.02	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102837	**0089_MW268_210316**	**MW268**	**16/03/2021**	0.05	0.06	0.30	<0.02	<0.01	<0.02	<0.1	0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102837	**0089_MW269_210316**	**MW269**	**16/03/2021**	0.06	0.10	0.59	<0.02	0.48	<0.02	<0.1	0.12	0.03	<0.02	0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102837	**0089_MW272_210316**	**MW272**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102955	**0089_MW282_210318**	**MW282**	**18/03/2021**	2.77	4.76	45.8	5.61	48.2	<0.02	1.3	12.6	2.05	2.17	*7.28*	<0.02	<0.02	0.04	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102900	**0089_MW288_210317**	**MW288**	**17/03/2021**	0.44	0.28	0.74	0.04	5.85	<0.02	<0.1	0.52	0.11	0.03	0.04	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.02	<0.05	<0.02
	EP2102837	**0089_MW289_210316**	**MW289**	**16/03/2021**	<0.02	<0.02	0.17	<0.02	0.80	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102954	**0089_MW516_210318**	**MW516**	**18/03/2021**	0.08	0.08	1.61	0.15	11.0	<0.02	1.1	0.24	0.03	0.04	0.15	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102954	**0089_MW517_210318**	**MW517**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102954	**0089_MW518_210318**	**MW518**	**18/03/2021**	0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102755	**0089_PW304_210315**	**PW304**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102892	**0089_PW306_210317**	**PW306**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102892	**0089_PW307_210317**	**PW307**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102892	**0089_PW308_210317**	**PW308**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102892	**0089_PW314_210317**	**PW314**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102892	**0089_PW315_210317**	**PW315**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102892	**0089_PW316_210317**	**PW316**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102836	**0089_PW329_210316**	**PW329**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102836	**0089_PW330_210316**	**PW330**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102836	**0089_PW331_210316**	**PW331**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_PW335_210315**	**PW335**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.07	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_PW340_210315**	**PW340**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.28	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_PW341_210315**	**PW341**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102834	**0089_PW345_210316**	**PW345**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_PW346_210317**	**PW346**	**17/03/2021**	0.03	<0.02	0.07	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_PW350_210317**	**PW350**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_PW351_210317**	**PW351**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_PW352_210317**	**PW352**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102836	**0089_PW356_210316**	**PW356**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102836	**0089_PW357_210316**	**PW357**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102836	**0089_PW358_210316**	**PW358**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102758	**0089_PW362_210315**	**PW362**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.23	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02

Table 1: Water Analytical Results

					PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - Fluorotelomer Sulfonic Acids				PFAS - Perfl		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorododecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorododecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of reporting					0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.02	0.05	0.02
Human Health - Drinking Water Quality Guideline															*0.56*													
Human Health – Recreational Water															**10**													
Ecological – 99% species protection									LOR*						19													
Monitoring Area	**Lab Report Number**	**Field ID**	**Location Code**	**Date**																								
	EP2102834	**0089_PW369_210316**	**PW369**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102758	**0089_PW374_210315**	**PW374**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102758	**0089_PW375_210315**	**PW375**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102758	**0089_PW378_210315**	**PW378**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_PW380_210317**	**PW380**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_PW381_210317**	**PW381**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_PW401_210317**	**PW401**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_PW405_210315**	**PW405**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102752	**0089_PW407_210315**	**PW407**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_PW409_210317**	**PW409**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102956	**0089_PW411_210318**	**PW411**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102941	**0089_PW413_210318**	**PW413**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102941	**0089_PW415_210318**	**PW415**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102756	**0089_SW130_210315**	**SW130**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102756	**0089_SW132_210315**	**SW132**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102756	**0089_SW134_210315**	**SW134**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102836	**0089_SW150_210316**	**SW150**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102836	**0089_SW152_210316**	**SW152**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102836	**0089_SW154_210316**	**SW154**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102836	**0089_SW156_210316**	**SW156**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102758	**0089_SW305_210315**	**SW305**	**15/03/2021**	<0.02	<0.02	0.03	<0.02	0.37	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102892	**0089_SW309_210317**	**SW309**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102890	**0089_SW310_210317**	**SW310**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102892	**0089_SW311_210317**	**SW311**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102758	**0089_SW317_210315**	**SW317**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102758	**0089_SW318_210315**	**SW318**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102758	**0089_SW319_210315**	**SW319**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_SW353_210317**	**SW353**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102834	**0089_SW370_210316**	**SW370**	**16/03/2021**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102758	**0089_SW371_210315**	**SW371**	**15/03/2021**	<0.02	<0.02	0.02	<0.02	0.22	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_SW372_210317**	**SW372**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_SW373_210317**	**SW373**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102892	**0089_SW382_210317**	**SW382**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102892	**0089_SW383_210317**	**SW383**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_SW384_210317**	**SW384**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102756	**0089_SW406_210315**	**SW406**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102756	**0089_SW408_210315**	**SW408**	**15/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102901	**0089_SW410_210317**	**SW410**	**17/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102956	**0089_SW412_210318**	**SW412**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102941	**0089_SW414_210318**	**SW414**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	EP2102941	**0089_SW416_210318**	**SW416**	**18/03/2021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

*LOR value adopted for PFOS

Table 1: Water Analytical Results

					Fluoroalkyl Sulfonamides				PFAS			Inorganics															Metals		
					N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	pH (Lab)	Sodium (filtered)	Sulphate as SO4 - Turbidimetric (filtered)	TDS	TOC	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	pH Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of reporting					0.05	0.05	0.02	0.05	0.01	0.01	0.01	1	1	1	1	0.01	0.01	1	0.01	0.01	1	1	10	1	5	1	1	1
Human Health - Drinking Water Quality Guideline									*0.07*																			
Human Health – Recreational Water									**2**																			
Ecological – 99% species protection																												
Monitoring Area	**Lab Report Number**	**Field ID**	**Location Code**	**Date**																								
	EP2102752	**0089_MW127_210315**	**MW166**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	***9.14***	9.87	10.1	<1	388	<1	388	37.8	41.9	943	5.24	7.75	568	164	2,550	4	38	140	109	50
	EP2102954	**0089_MW010_210318**	**MW010**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.08*	0.08	0.08	<1	396	<1	396	27.8	26.7	605	2.05	7.84	356	136	1,510	15	24	109	62	26
	EP2102833	**0089_MW109_210316**	**MW109**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	***7.36***	8.66	9.46	<1	434	<1	434	15.6	15.1	227	1.54	7.98	123	26	835	14	26	121	45	2
	EP2102833	**0089_MW112_210316**	**MW112**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	***51.0***	60.6	67.2	<1	211	<1	211	6.02	6.54	38	4.19	7.89	25	35	396	2	406	88	12	3
	EP2102833	**0089_MW117_210316**	**MW117**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	***38.0***	44.5	48.0	<1	401	<1	401	9.71	10.0	36	1.63	7.60	24	33	604	15	1,250	149	18	3
	EP2102833	**0089_MW120_210316**	**MW120**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	***7.14***	7.55	8.06	<1	236	<1	236	6.22	6.67	38	3.48	8.04	30	21	464	13	1,410	78	17	3
	EP2102833	**0089_MW121_210316**	**MW121**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	***47.0***	52.0	56.2	<1	211	<1	211	5.74	6.75	40	8.06	8.00	28	19	544	25	7,700	84	15	4
	EP2102833	**0089_MW123_210316**	**MW123**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.53*	1.27	1.35	<1	191	<1	191	5.29	5.72	47	3.96	7.93	26	7	319	6	179	74	10	3
	EP2102752	**0089_MW124_210315**	**MW124**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	324	<1	324	497	531	15,800	3.31	7.54	9,100	2,160	33,200	12	36	482	1,210	459
	EP2102752	**0089_MW125_210315**	**MW125**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.43*	0.70	0.82	<1	448	<1	448	533	586	16,900	4.68	7.48	9,990	2,290	35,000	12	145	542	1,350	508
	EP2102752	**0089_MW126_210315**	**MW126**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	400	<1	400	499	541	15,900	4.00	7.42	9,160	2,040	33,000	12	684	506	1,280	453
	EP2102752	**0089_MW127_210315**	**MW127**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	438	<1	438	460	508	14,600	4.88	7.41	8,600	1,920	31,000	22	188	432	1,230	431
	EP2102837	**0089_MW137_210316**	**MW137**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	251	<1	251	582	699	18,400	9.13	7.68	12,100	2,800	39,100	5	522	566	1,550	676
	EP2102837	**0089_MW139_210316**	**MW139**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	272	<1	272	71.3	71.8	2,180	0.36	8.01	1,120	210	4,340	3	11	165	161	63
	EP2102837	**0089_MW141_210316**	**MW141**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	***39.1***	47.3	49.1	<1	340	<1	340	362	404	11,400	5.42	7.51	6,860	1,630	23,800	7	541	432	907	363
	EP2102837	**0089_MW142_210316**	**MW142**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	***6.83***	8.79	9.03	<1	303	<1	303	400	468	12,600	7.84	7.62	7,990	1,870	27,100	15	155	445	1,070	420
	EP2102836	**0089_MW149_210316**	**MW149**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	232	<1	232	610	659	19,400	3.85	7.71	11,400	2,810	39,600	3	347	498	1,480	653
	EP2102752	**0089_MW158_210315**	**MW158**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	405	<1	405	143	146	4,390	0.95	7.76	2,400	524	9,480	12	6	202	343	112
	EP2102752	**0089_MW161_210315**	**MW161**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	***7.97***	8.54	8.72	<1	337	<1	337	32.6	30.5	779	3.30	7.84	437	188	1,990	5	642	78	81	38
	EP2102752	**0089_MW171_210315**	**MW171**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.18*	0.37	0.40	<1	358	<1	358	99.0	98.1	3,000	0.49	7.72	1,590	349	6,280	11	29	147	237	81
	EP2102833	**0089_MW173_210316**	**MW173**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	***7.99***	10.2	11.2	<1	583	<1	583	40.4	38.4	824	2.49	7.78	565	264	2,210	29	98	83	104	45
	EP2102833	**0089_MW193_210316**	**MW193**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	***12.1***	17.4	19.4	<1	629	<1	629	38.9	37.5	852	1.81	7.72	487	111	2,120	16	68	116	118	33
	EP2102833	**0089_MW195D_210316**	**MW195D**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	146	<1	146	418	436	13,500	2.11	7.59	7,390	1,670	26,400	<1	448	461	1,000	383
	EP2102833	**0089_MW195S_210316**	**MW195S**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	557	<1	557	50.7	51.7	1,160	0.96	7.82	650	328	3,060	16	199	186	155	53
	EP2102833	**0089_MW197_210316**	**MW197**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	454	<1	454	62.5	65.1	1,760	2.01	7.91	1,010	182	3,810	20	821	90	184	59
	EP2102833	**0089_MW200_210316**	**MW200**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	421	<1	421	93.0	96.6	2,780	1.88	7.91	1,720	299	5,690	8	37	123	160	98
	EP2102755	**0089_MW202_210315**	**MW202**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.09*	0.09	0.09	<1	319	<1	319	10.5	11.5	111	4.52	7.91	99	47	666	10	<5	100	24	8
	EP2102837	**0089_MW203_210316**	**MW203**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	0.02	<1	345	<1	345	9.51	10.5	44	4.84	7.99	56	66	552	4	194	80	47	7
	EP2102955	**0089_MW216_210318**	**MW216**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	***4.30***	13.3	13.8	<1	318	<1	318	16.7	16.5	309	0.72	7.79	144	80	1,070	6	486	135	40	8
	EP2102955	**0089_MW217_210318**	**MW217**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	0.02	36.4	36.4	<1	292	<1	292	7.31	6.85	39	3.24	7.98	32	18	355	3	78	93	9	3
	EP2102955	**0089_MW224_210318**	**MW224**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	214	<1	214	8.28	8.59	114	1.82	8.10	85	38	482	4	216	63	20	4
	EP2102900	**0089_MW226_210317**	**MW226**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	542	<1	542	459	509	14,200	5.14	7.72	8,660	2,300	32,600	54	94	444	1,170	546
	EP2102752	**0089_MW227_210315**	**MW227**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	528	<1	528	53.3	52.8	1,240	0.46	7.65	747	373	3,270	29	57	188	126	22
	EP2102752	**0089_MW228_210315**	**MW228**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.03	21.6	21.6	<1	491	<1	491	323	331	10,000	1.28	7.56	5,630	1,490	21,400	40	313	299	777	296
	EP2102755	**0089_MW233_210315**	**MW233**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.21*	0.21	0.21	<1	127	<1	127	3.06	3.49	15	6.53	8.17	19	5	180	5	46	42	6	3
	EP2102833	**0089_MW236_210316**	**MW236**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	***71.2***	75.5	80.6	<1	238	<1	238	6.28	7.15	40	6.47	7.95	22	19	425	6	94	95	17	2
	EP2102955	**0089_MW238_210318**	**MW238**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	189	<1	189	6.44	7.37	34	6.70	8.07	28	82	396	4	42	91	18	5
	EP2102954	**0089_MW239_210318**	**MW239**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	0.04	0.18	0.25	<1	217	<1	217	6.87	7.48	30	4.25	8.13	27	81	400	4	19	88	22	4
	EP2102954	**0089_MW240_210318**	**MW240**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	***3.26***	3.81	4.09	<1	241	<1	241	8.08	9.36	78	7.34	8.03	36	51	650	6	241	131	14	4
	EP2102954	**0089_MW242_210318**	**MW242**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	183	<1	183	4.94	5.41	25	4.54	8.10	18	28	283	5	82	72	12	2
	EP2102955	**0089_MW243_210318**	**MW243**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	263	<1	263	8.24	9.38	63	6.45	8.15	38	58	550	5	20	122	18	6
	EP2102955	**0089_MW245_210318**	**MW245**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	0.08	0.08	0.08	<1	494	<1	494	10.5	9.56	20	4.56	7.71	25	2	512	34	24	142	15	6
	EP2102954	**0089_MW248_210318**	**MW248**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	*1.78*	3.22	3.39	<1	437	<1	437	18.6	18.6	164	<0.01	7.89	163	253	1,060	16	<5	133	53	21
	EP2102755	**0089_MW249_210315**	**MW249**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.17*	0.17	0.17	<1	418	<1	418	12.6	12.5	130	0.38	7.91	106	29	699	20	1,080	92	37	11
	EP2102900	**0089_MW255_210317**	**MW255**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	*1.70*	2.08	2.15	<1	410	<1	410	10.8	9.83	65	4.77	7.96	68	38	540	10	986	106	18	4
	EP2102900	**0089_MW256_210317**	**MW256**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	***10.2***	12.8	13.4	<1	300	<1	300	13.6	12.7	239	3.23	7.98	130	40	775	5	222	111	17	5
	EP2102954	**0089_MW257_210318**	**MW257**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06	<1	193	<1	193	5.36	5.76	43	3.58	8.10	30	14	334	4	70	74	8	4
	EP2102954	**0089_MW259_210318**	**MW259**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.44*	0.68	0.70	<1	206	<1	206	5.40	5.99	33	5.21	7.94	26	17	303	9	220	75	13	2
	EP2102954	**0089_MW261_210318**	**MW261**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.26*	0.29	0.29	<1	396	<1	396	30.2	29.2	668	1.85	7.91	372	168	1,670	14	33	145	61	28
	EP2102954	**0089_MW264_210318**	**MW264**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	*1.35*	1.39	1.39	<1	438	<1	438	13.1	12.1	108	3.81	7.98	96	62	624	6	91	89	38	15
	EP2102837	**0089_MW268_210316**	**MW268**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.30*	0.40	0.46	<1	421	<1	421	116	119	3,270	1.54	7.92	1,890	730	7,250	16	72	206	292	116
	EP2102837	**0089_MW269_210316**	**MW269**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	*1.07*	1.29	1.39	<1	464	<1	464	23.9	25.1	444	2.54	8.07	309	101	1,280	22	44	88	82	22
	EP2102837	**0089_MW272_210316**	**MW272**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	271	<1	271	649	756	20,600	7.66	7.68	13,100	2,990	43,400	4	96	592	1,680	736
	EP2102955	**0089_MW282_210318**	**MW282**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	***94.0***	122	132	<1	632	<1	632	15.8	16.8	102	2.74	7.60	68	17	872	8	883	222	33	<1
	EP2102900	**0089_MW288_210317**	**MW288**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	***6.59***	7.73	8.07	<1	213	<1	213	9.79	10.3	124	2.42	7.91	107	98	566	14	490	57	31	9
	EP2102837	**0089_MW289_210316**	**MW289**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.97*	0.97	0.97	<1	318	<1	318	8.72	9.76	41	5.64	7.99	51	58	516	5	58	109	24	5
	EP2102954	**0089_MW516_210318**	**MW516**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	***12.6***	14.2	14.5	<1	460	<1	460	13.5	14.1	131	2.22	7.76	89	28	738	25	54	144	33	12
	EP2102954	**0089_MW517_210318**	**MW517**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	246	<1	246	7.14	7.41	76	1.82	7.88	58	4	398	10	306	82	9	2
	EP2102954	**0089_MW518_210318**	**MW518**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	0.02	0.04	0.04	<1	320	<1	320	23.8	22.7	504	2.20	8.02	246	151	1,440	10	308	123	66	18
	EP2102755	**0089_PW304_210315**	**PW304**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	352	<1	352	510	544	16,200	3.26	7.58	9,420	2,190	32,600	12	505	424	1,220	496
	EP2102892	**0089_PW306_210317**	**PW306**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	201	<1	201	649	609	20,600	3.13	7.62	10,600	3,050	44,700	8	97	465	1,340	576
	EP2102892	**0089_PW307_210317**	**PW307**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	646	595	20,600	4.17	7.91	10,400	3,030	43,900	5	174	424	1,300	557
	EP2102892	**0089_PW308_210317**	**PW308**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	156	<1	156	642	590	20,400	4.19	7.93	10,300	3,040	43,400	8	531	420	1,300	556
	EP2102892	**0089_PW314_210317**	**PW314**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	131	<1	131	657	607	20,900	3.96	7.74	10,600	3,110	45,900	5	145	433	1,330	577
	EP2102892	**0089_PW315_210317**	**PW315**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	121	<1	121	633	578	20,200	4.55	7.81	10,100	2,940	43,200	8	251	412	1,270	542
	EP2102892	**0089_PW316_210317**	**PW316**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	131	<1	131	687	636	21,900	3.86	7.85	11,100	3,220	42,800	8	419	451	1,400	615
	EP2102836	**0089_PW329_210316**	**PW329**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	186	<1	186	658	725	21,000	4.79	7.77	12,600	3,000	43,300	3	85	517	1,620	689
	EP2102836	**0089_PW330_210316**	**PW330**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	134	<1	134	661	713	21,200	3.76	7.77	12,400	2,920	43,700	2	148	511	1,590	685
	EP2102836	**0089_PW331_210316**	**PW331**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	172	<1	172	646	736	20,600	6.46	7.72	12,800	2,970	41,600	6	224	538	1,630	700
	EP2102752	**0089_PW335_210315**	**PW335**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.07*	0.07	0.07	<1	145	<1	145	660	727	21,200	4.77	7.52	12,700	2,860	42,500	6	1,680	508	1,600	674
	EP2102752	**0089_PW340_210315**	**PW340**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.28*	0.28	0.28	<1	133	<1	133	685	811	22,000	8.41	7.62	14,200	2,980	46,200	6	541	556	1,780	754
	EP2102752	**0089_PW341_210315**	**PW341**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	116	<1	116	662	744	21,200	5.81	7.66	13,000	2,960	44,000	9	253	513	1,640	689
	EP2102834	**0089_PW345_210316**	**PW345**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	277	<1	277	638	662	20,300	1.86	7.58	11,500	2,890	43,100	13	449	516	1,470	610
	EP2102901	**0089_PW346_210317**	**PW346**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.12*	0.15	0.15	<1	465	<1	465	609	736	19,300	9.40	7.62	12,700	2,660	36,700	38	856	634	1,610	742
	EP2102901	**0089_PW350_210317**	**PW350**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05	<1	161	<1	161	680	733	21,700	3.74	7.59	12,700	3,110	43,400	16	241	527	1,640	750
	EP2102901	**0089_PW351_210317**	**PW351**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	141	<1	141	660	708	21,100	3.49	7.81	12,300	3,000	41,900	3	122	507	1,580	702
	EP2102901	**0089_PW352_210317**	**PW352**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	126	<1	126	656	691	21,000	2.55	7.91	12,000	2,960	41,200	4	104	493	1,540	689
	EP2102836	**0089_PW356_210316**	**PW356**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	317	<1	317	652	768	20,700	8.16	7.72	13,300	2,960	43,400	5	1,410	584	1,720	725
	EP2102836	**0089_PW357_210316**	**PW357**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	142	<1	142	658	707	21,100	3.60	7.75	12,300	2,890	42,300	4	194	504	1,580	671
	EP2102836	**0089_PW358_210316**	**PW358**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	131	<1	131	663	689	21,200	1.92	7.73	12,000	2,990	43,500	5	106	489	1,530	646
	EP2102758	**0089_PW362_210315**	**PW362**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.23*	0.23	0.23	<1	118	<1	118	614	749	19,500	9.88	7.77	13,100	2,960	43,800	7	406	512	1,650	688
	EP2102752	**0089_PW363_210315**	**PW363**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	122	<1	122	662	747	21,200	6.07	7.62	13,100	2,940	43,400	3	234	512	1,630	690
	EP2102755	**0089_PW364_210315**	**PW364**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	120	<1	120	669	735	21,500	4.69	7.67	12,800	2,880	43,900	2	76	510	1,640	685
	EP2102758	**0089_PW367_210315**	**PW367**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.04	<1	296	<1	296	658	679	21,000	1.52	7.47	12,100	2,890	44,300	15	479	476	1,350	688
	EP2102758	**0089_PW368_210315**	**PW368**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	102	<1	102	592	707	18,800	8.83	7.71	12,400	2,860	42,600	6	79	481	1,540	645

Table 1: Water Analytical Results

					Fluoroalkyl Sulfonamides				PFAS			Inorganics														Metals		
					N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	pH (Lab)	Sodium (filtered)	Sulphate as SO4 - Turbidimetric (filtered)	TDS	TOC	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	pH Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of reporting					0.05	0.05	0.02	0.05	0.01	0.01	0.01	1	1	1	1	0.01	0.01	1	0.01	0.01	1	1	10	1	5	1	1	1
Human Health - Drinking Water Quality Guideline									*0.07*																		
Human Health – Recreational Water									**2**																		
Ecological – 99% species protection																											
Monitoring Area	**Lab Report Number**	**Field ID**	**Location Code**	**Date**																								
	EP2102834	**0089_PW369_210316**	**PW369**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	179	<1	179	651	712	20,800	4.50	7.65	12,400	2,920	44,700	9	353	524	1,580	662
	EP2102758	**0089_PW374_210315**	**PW374**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	119	<1	119	657	687	21,100	2.26	7.86	12,300	2,860	43,300	7	90	452	1,360	702
	EP2102758	**0089_PW375_210315**	**PW375**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	116	<1	116	642	672	20,600	2.28	7.98	12,000	2,800	42,700	4	66	435	1,340	692
	EP2102758	**0089_PW378_210315**	**PW378**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	102	<1	102	639	661	20,500	1.68	7.78	11,800	2,810	43,500	4	134	432	1,320	675
	EP2102901	**0089_PW380_210317**	**PW380**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	137	<1	137	708	719	22,700	0.76	7.73	12,500	3,140	43,200	12	314	510	1,600	723
	EP2102901	**0089_PW381_210317**	**PW381**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	125	<1	125	632	697	20,200	4.87	7.86	12,100	2,870	40,700	2	105	504	1,550	696
	EP2102901	**0089_PW401_210317**	**PW401**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	130	<1	130	663	675	21,200	0.91	7.89	11,700	2,980	41,500	2	136	487	1,510	680
	EP2102752	**0089_PW405_210315**	**PW405**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	105	<1	105	662	709	21,200	3.45	7.71	12,400	2,950	42,700	4	1,060	486	1,560	660
	EP2102752	**0089_PW407_210315**	**PW407**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	110	<1	110	649	714	20,800	4.77	7.81	12,500	2,890	44,500	2	16,500	488	1,570	659
	EP2102901	**0089_PW409_210317**	**PW409**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	138	<1	138	714	828	22,800	7.43	7.77	14,400	3,270	47,200	7	85	585	1,840	844
	EP2102956	**0089_PW411_210318**	**PW411**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	137	<1	137	634	634	20,300	0.03	7.74	11,000	2,800	43,000	5	137	457	1,430	592
	EP2102941	**0089_PW413_210318**	**PW413**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	198	<1	198	615	680	19,500	5.09	7.62	11,800	2,910	42,800	5	395	501	1,530	638
	EP2102941	**0089_PW415_210318**	**PW415**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	143	<1	143	410	402	12,900	0.98	7.80	7,010	2,080	25,500	7	64	294	881	392
	EP2102756	**0089_SW130_210315**	**SW130**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	108	<1	108	589	714	18,700	9.61	7.92	12,500	2,850	41,000	11	643	491	1,570	658
	EP2102756	**0089_SW132_210315**	**SW132**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	118	<1	118	647	646	20,800	0.07	7.92	11,700	2,790	43,500	13	574	424	1,290	392
	EP2102756	**0089_SW134_210315**	**SW134**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	113	<1	113	592	721	18,900	9.76	8.03	12,600	2,740	42,700	5	172	495	1,590	666
	EP2102836	**0089_SW150_210316**	**SW150**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	113	<1	113	653	768	20,900	8.12	8.05	13,400	2,940	42,400	2	145	542	1,700	732
	EP2102836	**0089_SW152_210316**	**SW152**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	656	725	21,000	5.00	8.02	12,600	2,930	42,400	2	104	515	1,620	690
	EP2102836	**0089_SW154_210316**	**SW154**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	663	702	21,300	2.84	8.00	12,200	2,870	43,000	8	58	493	1,570	670
	EP2102836	**0089_SW156_210316**	**SW156**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	113	<1	113	663	739	21,200	5.43	8.01	12,900	3,000	43,200	2	12	515	1,630	700
	EP2102758	**0089_SW305_210315**	**SW305**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.40*	0.40	0.40	<1	110	<1	110	585	714	18,600	9.99	7.95	12,500	2,780	42,100	3	40	496	1,570	658
	EP2102892	**0089_SW309_210317**	**SW309**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	109	<1	109	631	565	20,200	5.55	8.15	9,870	2,850	43,200	1	10	402	1,240	528
	EP2102890	**0089_SW310_210317**	**SW310**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	108	<1	108	601	712	19,200	8.52	8.03	12,400	2,730	42,600	1	18	505	1,580	700
	EP2102892	**0089_SW311_210317**	**SW311**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	112	<1	112	623	612	19,800	0.86	8.09	10,700	2,970	42,400	2	12	433	1,340	575
	EP2102758	**0089_SW317_210315**	**SW317**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	111	<1	111	636	637	20,400	0.11	8.21	11,400	2,790	41,400	3	<5	404	1,270	648
	EP2102758	**0089_SW318_210315**	**SW318**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	111	<1	111	589	709	18,700	9.18	8.25	12,400	2,870	42,100	1	<5	485	1,560	653
	EP2102758	**0089_SW319_210315**	**SW319**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	111	<1	111	642	659	20,600	1.35	8.23	11,800	2,800	42,900	2	<5	432	1,300	677
	EP2102901	**0089_SW353_210317**	**SW353**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	112	<1	112	637	673	20,400	2.75	7.94	11,700	2,850	38,800	2	34	474	1,500	667
	EP2102834	**0089_SW370_210316**	**SW370**	**16/03/2021**	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	119	<1	119	637	671	20,400	2.62	7.80	11,700	2,840	43,300	8	236	474	1,490	626
	EP2102758	**0089_SW371_210315**	**SW371**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	*0.24*	0.24	0.24	<1	186	<1	186	644	655	20,600	0.86	7.95	11,700	2,820	42,700	3	53	409	1,320	657
	EP2102901	**0089_SW372_210317**	**SW372**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	113	<1	113	657	739	21,000	5.89	8.11	12,800	2,990	40,000	2	26	537	1,660	741
	EP2102901	**0089_SW373_210317**	**SW373**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	112	<1	112	631	714	20,100	6.17	8.04	12,400	2,990	41,400	3	65	504	1,600	715
	EP2102892	**0089_SW382_210317**	**SW382**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	110	<1	110	634	547	20,200	7.29	7.75	9,550	2,960	41,200	3	23	392	1,210	506
	EP2102892	**0089_SW383_210317**	**SW383**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	119	<1	119	624	568	19,900	4.76	7.96	9,910	2,920	40,200	2	29	406	1,250	532
	EP2102901	**0089_SW384_210317**	**SW384**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	113	<1	113	649	724	20,800	5.50	8.00	12,600	2,880	41,100	2	18	512	1,610	716
	EP2102756	**0089_SW406_210315**	**SW406**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	116	<1	116	592	686	18,800	7.40	7.57	12,000	2,840	43,500	84	128	475	1,510	640
	EP2102756	**0089_SW408_210315**	**SW408**	**15/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	597	709	19,000	8.60	7.10	12,400	2,810	42,000	102	138	489	1,560	664
	EP2102901	**0089_SW410_210317**	**SW410**	**17/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	112	<1	112	656	755	21,000	7.01	8.20	13,100	2,960	38,300	2	8	540	1,690	758
	EP2102956	**0089_SW412_210318**	**SW412**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	111	<1	111	625	638	20,100	0.97	7.81	11,100	2,700	41,500	2	10	443	1,430	589
	EP2102941	**0089_SW414_210318**	**SW414**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	107	<1	107	601	642	19,200	3.32	8.01	11,200	2,760	41,800	3	61	448	1,430	598
	EP2102941	**0089_SW416_210318**	**SW416**	**18/03/2021**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	631	655	20,200	1.88	8.03	11,400	2,840	42,600	1	9	461	1,470	608

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

*LOR value adopted for PFOS

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Table 2: Sediment Analytical Results

				PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - Fluorotelomer Sulfonic Acids			
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting				0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005
Ecological - Direct Exposure (Interim Guidleines)								*1*						*10*										
Ecological - Indirect Exposure (Interim Guidelines)								0.01																
Human Health - Commercial/Industrial (On-base)														**50**										
Lab Report Number	**Field ID**	**Location Code**	**Date**																					
EP2102754	**0089_SD335_210315**	**SD335**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102754	**0089_SD341_210315**	**SD341**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102754	**0089_SD363_210315**	**SD363**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102754	**0089_SD405_210315**	**SD405**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102754	**0089_SD407_210315**	**SD407**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102757	**0089_SD304_210315**	**SD304**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102757	**0089_SD340_210315**	**SD340**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102757	**0089_SD362_210315**	**SD362**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102757	**0089_SD364_210315**	**SD364**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102757	**0089_SD367_210315**	**SD367**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102757	**0089_SD368_210315**	**SD368**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102757	**0089_SD374_210315**	**SD374**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102757	**0089_SD375_210315**	**SD375**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102757	**0089_SD378_210315**	**SD378**	**15/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102835	**0089_SD345_210316**	**SD345**	**16/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	0.0017	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102835	**0089_SD369_210316**	**SD369**	**16/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102838	**0089_SD329_210316**	**SD329**	**16/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102838	**0089_SD330_210316**	**SD330**	**16/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102838	**0089_SD331_210316**	**SD331**	**16/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102838	**0089_SD356_210316**	**SD356**	**16/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102838	**0089_SD357_210316**	**SD357**	**16/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102838	**0089_SD358_210316**	**SD358**	**16/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD306_210317**	**SD306**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD307_210317**	**SD307**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD308_210317**	**SD308**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD314_210317**	**SD314**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD315_210317**	**SD315**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD316_210317**	**SD316**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD350_210317**	**SD350**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD351_210317**	**SD351**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD352_210317**	**SD352**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD380_210317**	**SD380**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD381_210317**	**SD381**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102888	**0089_SD401_210317**	**SD401**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102902	**0089_SD346_210317**	**SD346**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	0.0008	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102902	**0089_SD409_210317**	**SD409**	**17/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102942	**0089_SD411_210318**	**SD411**	**18/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102942	**0089_SD413_210318**	**SD413**	**18/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
EP2102942	**0089_SD415_210318**	**SD415**	**18/03/2021**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

Table 2: Sediment Analytical Results

				PFAS - Perfluoroalkyl Sulfonamides							PFAS			Inorganics									Organic
				Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	Exchangeable Sodium Percent	Moisture Content	Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	CEC	Electrical conductivity *(lab)	pH (Lab)	Organic Matter
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	%	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	µS/cm	pH Units	%
LOR - Limit of Reporting				0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	0.5
Ecological - Direct Exposure (Interim Guidleines)																							
Ecological - Indirect Exposure (Interim Guidelines)																							
Human Health - Commercial/Industrial (On-base)											20												
Lab Report Number	**Field ID**	**Location Code**	**Date**																				
EP2102754	**0089_SD335_210315**	**SD335**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0005	0.0005	3.8	25.2	2.9	0.4	<0.1	0.1	3.5	3,980	8.6	0.5
EP2102754	**0089_SD341_210315**	**SD341**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	3.1	24.1	2.9	0.4	<0.1	0.1	3.5	4,170	8.7	0.6
EP2102754	**0089_SD363_210315**	**SD363**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	3.1	25.3	2.7	0.4	<0.1	0.1	3.2	3,990	8.7	0.7
EP2102754	**0089_SD405_210315**	**SD405**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	1.4	25.9	8.8	0.9	<0.1	0.1	9.9	3,770	8.8	0.6
EP2102754	**0089_SD407_210315**	**SD407**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.3	24.7	2.8	0.4	<0.1	<0.1	3.3	3,780	8.8	0.6
EP2102757	**0089_SD304_210315**	**SD304**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.6	26.6	3.1	0.5	<0.1	<0.1	3.7	3,060	8.4	0.8
EP2102757	**0089_SD340_210315**	**SD340**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	3.1	25.0	2.7	0.4	<0.1	<0.1	3.2	3,760	8.6	<0.5
EP2102757	**0089_SD362_210315**	**SD362**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002	0.0002	3.6	24.2	2.4	0.4	<0.1	0.1	2.9	4,400	8.6	<0.5
EP2102757	**0089_SD364_210315**	**SD364**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.9	24.6	2.6	0.4	<0.1	<0.1	3.1	3,880	8.6	<0.5
EP2102757	**0089_SD367_210315**	**SD367**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	1.8	31.4	15.4	1.9	<0.1	0.3	17.6	4,520	8.3	0.8
EP2102757	**0089_SD368_210315**	**SD368**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.8	25.8	3.0	0.4	<0.1	<0.1	3.5	2,550	8.7	<0.5
EP2102757	**0089_SD374_210315**	**SD374**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	1.3	17.5	13.5	1.3	<0.1	0.2	15.0	2,510	8.8	0.6
EP2102757	**0089_SD375_210315**	**SD375**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002	0.0002	2.4	18.4	5.1	0.6	<0.1	0.1	5.9	2,700	8.8	<0.5
EP2102757	**0089_SD378_210315**	**SD378**	**15/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	1.3	12.0	11.5	1.1	<0.1	0.2	12.7	1,950	8.8	0.5
EP2102835	**0089_SD345_210316**	**SD345**	**16/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0017	0.0017	0.0017	3.4	28.6	3.7	0.6	<0.1	0.2	4.5	3,760	8.3	<0.5
EP2102835	**0089_SD369_210316**	**SD369**	**16/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.0	36.6	3.8	1.3	<0.1	0.2	5.3	5,060	8.2	0.9
EP2102838	**0089_SD329_210316**	**SD329**	**16/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.5	22.6	3.8	0.5	<0.1	0.1	4.4	3,400	8.7	<0.5
EP2102838	**0089_SD330_210316**	**SD330**	**16/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.7	23.9	4.1	0.6	<0.1	0.1	4.9	3,340	9.0	<0.5
EP2102838	**0089_SD331_210316**	**SD331**	**16/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.6	24.6	4.0	0.5	<0.1	0.1	4.6	3,470	8.9	<0.5
EP2102838	**0089_SD356_210316**	**SD356**	**16/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.5	23.0	2.4	0.3	<0.1	<0.1	2.8	3,280	8.9	<0.5
EP2102838	**0089_SD357_210316**	**SD357**	**16/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.6	27.1	4.0	0.5	<0.1	0.1	4.7	3,580	8.9	<0.5
EP2102838	**0089_SD358_210316**	**SD358**	**16/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.4	26.5	4.2	0.5	<0.1	0.1	4.8	3,890	8.6	<0.5
EP2102888	**0089_SD306_210317**	**SD306**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.2	26.1	1.8	0.3	<0.1	<0.1	2.2	3,490	9.1	<0.5
EP2102888	**0089_SD307_210317**	**SD307**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.5	22.4	4.4	0.6	<0.1	0.1	5.1	3,300	9.2	<0.5
EP2102888	**0089_SD308_210317**	**SD308**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	5.1	17.1	2.2	0.3	<0.1	0.1	2.7	2,350	9.4	<0.5
EP2102888	**0089_SD314_210317**	**SD314**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.9	20.4	3.9	0.5	<0.1	0.1	4.5	2,880	9.2	<0.5
EP2102888	**0089_SD315_210317**	**SD315**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	3.6	19.2	3.8	0.5	<0.1	0.2	4.4	2,750	9.3	<0.5
EP2102888	**0089_SD316_210317**	**SD316**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	5.2	25.5	2.7	0.4	<0.1	0.2	3.2	3,850	9.2	<0.5
EP2102888	**0089_SD350_210317**	**SD350**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0005	0.0005	2.0	23.7	11.3	1.1	<0.1	0.2	12.7	3,040	9.2	<0.5
EP2102888	**0089_SD351_210317**	**SD351**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	3.7	23.5	4.0	0.5	<0.1	0.2	4.7	2,880	9.2	<0.5
EP2102888	**0089_SD352_210317**	**SD352**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	6.9	18.2	2.0	0.3	<0.1	0.2	2.5	2,460	9.4	<0.5
EP2102888	**0089_SD380_210317**	**SD380**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	2.8	20.5	6.3	0.6	<0.1	0.2	7.2	3,310	9.3	<0.5
EP2102888	**0089_SD381_210317**	**SD381**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	7.0	22.7	2.1	0.3	<0.1	0.2	2.6	3,480	9.3	<0.5
EP2102888	**0089_SD401_210317**	**SD401**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004	3.5	20.7	4.5	0.5	<0.1	0.2	5.2	3,460	9.2	<0.5
EP2102902	**0089_SD346_210317**	**SD346**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0008	0.0008	0.0008	3.5	42.2	10.6	4.6	<0.1	0.6	15.8	5,790	8.3	3.1
EP2102902	**0089_SD409_210317**	**SD409**	**17/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	3.0	24.2	3.6	0.5	<0.1	0.1	4.2	3,270	9.2	<0.5
EP2102942	**0089_SD411_210318**	**SD411**	**18/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	6.4	22.5	2.9	0.5	<0.1	0.2	3.6	3,250	9.1	0.8
EP2102942	**0089_SD413_210318**	**SD413**	**18/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	5.2	18.0	2.6	0.4	<0.1	0.2	3.2	2,400	9.2	0.9
EP2102942	**0089_SD415_210318**	**SD415**	**18/03/2021**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	4.0	22.0	3.1	0.3	<0.1	0.1	3.6	1,950	9.1	0.6

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

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Table 3: Rinsate Blank Analytical Results

				PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05
Lab Report Number	**Field ID**	**Date**	**Sample Type**																		
EP2102755	**0089_QC301_210315**	**15/03/2021**	**Rinsate**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102755	**0089_QC302_210315**	**15/03/2021**	**Rinsate**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102755	**0089_QC303_210315**	**15/03/2021**	**Rinsate**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102755	**0089_QC401_210315**	**15/03/2021**	**Field_B**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102755	**0089_QC402_210315**	**15/03/2021**	**Field_B**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102755	**0089_QC403_210315**	**15/03/2021**	**Field_B**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102833	**0089_QC301_210316**	**16/03/2021**	**Rinsate**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102833	**0089_QC302_210316**	**16/03/2021**	**Rinsate**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102833	**0089_QC303_210316**	**16/03/2021**	**Rinsate**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102833	**0089_QC401_210316**	**16/03/2021**	**Field_B**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102833	**0089_QC402_210316**	**16/03/2021**	**Field_B**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102833	**0089_QC403_210316**	**16/03/2021**	**Field_B**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102900	**0089_QC301_210317**	**17/03/2021**	**Rinsate**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102900	**0089_QC302_210317**	**17/03/2021**	**Rinsate**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102900	**0089_QC303_210317**	**17/03/2021**	**Rinsate**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102900	**0089_QC401_210317**	**17/03/2021**	**Field_B**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102900	**0089_QC402_210317**	**17/03/2021**	**Field_B**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102900	**0089_QC403_210317**	**17/03/2021**	**Field_B**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102954	**0089_QC301_210318**	**18/03/2021**	**Rinsate**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102954	**0089_QC302_210318**	**18/03/2021**	**Rinsate**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102954	**0089_QC401_210318**	**18/03/2021**	**Field_B**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
EP2102954	**0089_QC402_210318**	**18/03/2021**	**Field_B**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05

Statistics

% of Detects	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
% of Non-Detects	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

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Table 3: Rinsate Blanks Analytical Results

	. - Fluorotelomer Sulfonic Acids			PFAS - Perfluoroalkyl Sulfonamides							PFAS		
	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01
Lab Report Number	**Field ID**	**Date**	**Sample Type**										
EP2102755	0089_QC301_210315	15/03/2021	Rinsate	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102755	0089_QC302_210315	15/03/2021	Rinsate	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102755	0089_QC303_210315	15/03/2021	Rinsate	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102755	0089_QC401_210315	15/03/2021	Field_B	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102755	0089_QC402_210315	15/03/2021	Field_B	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102755	0089_QC403_210315	15/03/2021	Field_B	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102833	0089_QC301_210316	16/03/2021	Rinsate	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102833	0089_QC302_210316	16/03/2021	Rinsate	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102833	0089_QC303_210316	16/03/2021	Rinsate	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102833	0089_QC401_210316	16/03/2021	Field_B	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102833	0089_QC402_210316	16/03/2021	Field_B	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102833	0089_QC403_210316	16/03/2021	Field_B	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102900	0089_QC301_210317	17/03/2021	Rinsate	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102900	0089_QC302_210317	17/03/2021	Rinsate	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102900	0089_QC303_210317	17/03/2021	Rinsate	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102900	0089_QC401_210317	17/03/2021	Field_B	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102900	0089_QC402_210317	17/03/2021	Field_B	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102900	0089_QC403_210317	17/03/2021	Field_B	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102954	0089_QC301_210318	18/03/2021	Rinsate	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102954	0089_QC302_210318	18/03/2021	Rinsate	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102954	0089_QC401_210318	18/03/2021	Field_B	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
EP2102954	0089_QC402_210318	18/03/2021	Field_B	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01

Statistics

% of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Non-Detects	100	100	100	100	100	100	100	100	100	100	100	100	100

Location Code						PW368	PW368		PW368	PW368		SW371	SW371		SW371	SW371		MW233	MW233	
Field ID						0089_PW368_210315	0089_QC102_210315		0089_PW368_210315	0089_QC202_210315		0089_SW371_210315	0089_QC103_210315		0089_SW371_210315	0089_QC203_210315		0089_MW233_210315	0089_QC104_210315	
Lab Report Number						EP2102758	EP2102758		EP2102758	781350		EP2102758	EP2102758		EP2102758	781350		EP2102755	EP2102755	
Date						15/03/2021	15/03/2021	RPD	15/03/2021	15/03/2021	RPD	15/03/2021	15/03/2021	RPD	15/03/2021	15/03/2021	RPD	15/03/2021	15/03/2021	RPD
	Unit	EQL	Human Health - Drinking Water	Human Health – Recreational Water	Ecological – 99% species protection															
PFAS - Perfluoroalkyl Sulfonic Acids																				
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01				-	-	-	-	<0.01	-	-	-	-	-	<0.01	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	0.02	0.02	0	0.02	0.02	0	0.10	0.14	33
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01			0.01	0.04	0.03	29	0.04	0.02	67	0.22	0.24	9	0.22	0.10	75	0.11	0.12	9
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01				-	-	-	-	<0.01	-	-	-	-	-	<0.01	-	-	-	-
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
PFAS - Perfluoroalkyl Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	µg/L	0.05				<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.56	10	19	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorononanoic acid (PFNA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
PFAS - Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
PFAS - Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS																				
Sum of PFHxS and PFOS	µg/L	0.01	0.07	2		0.04	0.03	29	0.04	0.02	67	0.24	0.26	8	0.24	0.12	67	0.21	0.26	21
Sum of PFAS (WA DER List)	µg/L	0.01				0.04	0.03	29	0.04	<0.05	0	0.24	0.26	8	0.24	0.12	67	0.21	0.26	21
Sum of PFAS	µg/L	0.01				0.04	0.03	29	0.04	<0.1	0	0.24	0.26	8	0.24	0.12	67	0.21	0.26	21
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01				-	-	-	-	0.02	-	-	-	-	-	0.12	-	-	-	-
Sum of PFAS (PFOS + PFOA)	µg/L	0.01				-	-	-	-	0.02	-	-	-	-	-	0.1	-	-	-	-
Inorganics																				
Carbonate Alkalinity (as CaCO3)	mg/L	1				<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0	<1	<1	0
Alkalinity (Bicarbonate as CaCO3)	mg/L	1				102	112	9	102	120	16	186	119	44	186	140	28	127	136	7
Alkalinity (Hydroxide) as CaCO3	mg/L	1				<1	<1	0	<1	-	-	<1	<1	0	<1	-	-	<1	<1	0
Alkalinity (total) as CaCO3	mg/L	1				102	112	9	102	-	-	186	119	44	186	-	-	127	136	7
Anions Total	meq/L	0.01				592	639	8	592	-	-	644	639	1	644	-	-	3.06	3.30	8
Cations Total	meq/L	0.01				707	660	7	707	-	-	655	632	4	655	-	-	3.49	3.27	7
Chloride	mg/L	1				18,800	20,500	9	18,800	21,000	11	20,600	20,500	0	20,600	19,000	8	15	17	12
Ionic Balance	%	0.01				8.83	1.59	139	8.83	-	-	0.86	0.50	53	0.86	-	-	6.53	0.51	171
Ammonia as N	mg/L	0.01				-	-	-	-	0.15	-	-	-	-	-	0.03	-	-	-	-
Nitrate (as N)	mg/L	0.02				-	-	-	-	<0.02	-	-	-	-	-	<0.02	-	-	-	-
pH (Lab)	pH Units	0.01				7.71	7.72	0	7.71	7.8	1	7.95	7.98	0	7.95	8.0	1	8.17	8.19	0
Sodium	mg/L	0.5				-	-	-	-	15,000	-	-	-	-	-	12,000	-	-	-	-
Sodium (filtered)	mg/L	0.5				12,400	11,800	5	12,400	-	-	11,700	11,300	3	11,700	-	-	19	18	5
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1				2,860	2,810	2	2,860	-	-	2,820	2,790	1	2,820	-	-	5	5	0
Sulphate	mg/L	5				-	-	-	-	3,200	-	-	-	-	-	3,100	-	-	-	-
TDS	mg/L	10				42,600	42,600	0	42,600	40,000	6	42,700	42,800	0	42,700	59,000	32	180	188	4
TOC	mg/L	1				6	4	40	6	6.3	5	3	3	0	3	6.2	70	5	5	0
Total Suspended Solids	mg/L	1				79	52	41	79	86	8	53	48	10	53	620	168	46	52	12
Metals																				
Calcium	mg/L	0.5				-	-	-	-	690	-	-	-	-	-	560	-	-	-	-
Calcium (filtered)	mg/L	0.5				481	421	13	481	-	-	409	390	5	409	-	-	42	40	5
Magnesium	mg/L	0.5				-	-	-	-	1,900	-	-	-	-	-	1,500	-	-	-	-
Magnesium (filtered)	mg/L	0.5				1,540	1,310	16	1,540	-	-	1,320	1,270	4	1,320	-	-	6	5	18
Potassium	mg/L	0.5				-	-	-	-	560	-	-	-	-	-	450	-	-	-	-
Potassium (filtered)	mg/L	0.5				645	686	6	645	-	-	657	658	0	657	-	-	3	3	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: No Limit (1 - 10 x EQL); 50 (10 - 20 x EQL); 20 (> 20 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory
EQL - Estimated Quantitation Limit

Location Code						MW233	MW233		PW374	PW374		PW374	PW374		SW319	SW319		SW319	SW319	
Field ID						0089_MW233_210315	0089_QC204_210315		0089_PW374_210315	0089_QC106_210315		0089_PW374_210315	0089_QC206_210315		0089_SW319_210315	0089_QC107_210315		0089_SW319_210315	0089_QC207_210315	
Lab Report Number						EP2102755	781350		EP2102758	EP2102758		EP2102758	781350		EP2102758	EP2102758		EP2102758	781350	
Date						15/03/2021	15/03/2021	RPD	15/03/2021	15/03/2021	RPD	15/03/2021	15/03/2021	RPD	15/03/2021	15/03/2021	RPD	15/03/2021	15/03/2021	RPD
	Unit	EQL	Human Health - Drinking Water	Human Health – Recreational Water	Ecological – 99% species protection															
PFAS - Perfluoroalkyl Sulfonic Acids																				
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01				-	<0.01	-	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01				0.10	0.11	10	<0.02	<0.02	0	<0.02	0.07	111	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01			0.01	0.11	0.10	10	0.04	0.02	67	0.04	0.04	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01				-	<0.01	-	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	µg/L	0.05				<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01				<0.02	0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.56	10	19	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02				<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02				<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02				<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS																				
Sum of PFHxS and PFOS	µg/L	0.01	0.07	2		0.21	0.21	0	0.04	0.02	67	0.04	0.11	93	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFAS (WA DER List)	µg/L	0.01				0.21	0.22	5	0.04	0.02	67	0.04	0.13	106	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFAS	µg/L	0.01				0.21	0.22	5	0.04	0.02	67	0.04	0.13	106	<0.01	<0.01	0	<0.01	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01				-	0.21	-	-	-	-	-	0.12	-	-	-	-	-	<0.01	-
Sum of PFAS (PFOS + PFOA)	µg/L	0.01				-	0.1	-	-	-	-	-	0.05	-	-	-	-	-	<0.01	-
Inorganics																				
Carbonate Alkalinity (as CaCO3)	mg/L	1				<1	<10	0	<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0
Alkalinity (Bicarbonate as CaCO3)	mg/L	1				127	150	17	119	114	4	119	140	16	111	113	2	111	130	16
Alkalinity (Hydroxide) as CaCO3	mg/L	1				<1	-	-	<1	<1	0	<1	-	-	<1	<1	0	<1	-	-
Alkalinity (total) as CaCO3	mg/L	1				127	-	-	119	114	4	119	-	-	111	113	2	111	-	-
Anions Total	meq/L	0.01				3.06	-	-	657	591	11	657	-	-	642	583	10	642	-	-
Cations Total	meq/L	0.01				3.49	-	-	687	721	5	687	-	-	659	708	7	659	-	-
Chloride	mg/L	1				15	43	97	21,100	18,800	12	21,100	21,000	0	20,600	18,500	11	20,600	19,000	8
Ionic Balance	%	0.01				6.53	-	-	2.26	9.88	126	2.26	-	-	1.35	9.69	151	1.35	-	-
Ammonia as N	mg/L	0.01				-	0.32	-	-	-	-	-	0.11	-	-	-	-	-	0.09	-
Nitrate (as N)	mg/L	0.02				-	0.04	-	-	-	-	-	0.45	-	-	-	-	-	<0.02	-
pH (Lab)	pH Units	0.01				8.17	8.2	0	7.86	7.76	1	7.86	7.9	1	8.23	8.22	0	8.23	8.3	1
Sodium	mg/L	0.5				-	16	-	-	-	-	-	13,000	-	-	-	-	-	12,000	-
Sodium (filtered)	mg/L	0.5				19	-	-	12,300	12,600	2	12,300	-	-	11,800	12,400	5	11,800	-	-
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1				5	-	-	2,860	2,820	1	2,860	-	-	2,800	2,820	1	2,800	-	-
Sulphate	mg/L	5				-	7.4	-	-	-	-	-	3,100	-	-	-	-	-	3,100	-
TDS	mg/L	10				180	270	40	43,300	43,000	1	43,300	56,000	26	42,900	42,200	2	42,900	56,000	26
TOC	mg/L	1				5	9.6	63	7	8	13	7	12	53	2	3	40	2	8.0	120
Total Suspended Solids	mg/L	1				46	180	119	90	63	35	90	210	80	<5	11	75	<5	16	105
Metals																				
Calcium	mg/L	0.5				-	41	-	-	-	-	-	530	-	-	-	-	-	450	-
Calcium (filtered)	mg/L	0.5				42	-	-	452	499	10	452	-	-	432	488	12	432	-	-
Magnesium	mg/L	0.5				-	5.7	-	-	-	-	-	1,400	-	-	-	-	-	1,400	-
Magnesium (filtered)	mg/L	0.5				6	-	-	1,360	1,590	16	1,360	-	-	1,300	1,550	18	1,300	-	-
Potassium	mg/L	0.5				-	2.5	-	-	-	-	-	430	-	-	-	-	-	470	-
Potassium (filtered)	mg/L	0.5				3	-	-	702	668	5	702	-	-	677	649	4	677	-	-

Location Code			PW329	PW329		PW329	PW329		MW117	MW117		MW117	MW117		SW156	SW156	
Field ID			0089_PW329_210316	0089_QC110_210316		0089_PW329_210316	0089_QC210_210316		0089_MW117_210316	0089_QC109_210316		0089_MW117_210316	0089_QC209_210316		0089_SW156_210316	0089_QC111_210316	
Lab Report Number			EP2102836	EP2102836		EP2102836	781350		EP2102833	EP2102833		EP2102833	781350		EP2102836	EP2102836	
Date			16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD
	Unit	EQL	Human Health - Drinking Water	Human Health – Recreational Water	Ecological – 99% species protection												
PFAS - Perfluoroalkyl Sulfonic Acids																	
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01				-	-	-	-	<0.01	-	-	-	-	-	0.14	-	-	-	-	-
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	0.57	0.56	2	0.57	0.39	37	<0.02	<0.02	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	1.35	1.30	4	1.35	0.84	47	<0.02	<0.02	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	13.0	13.2	2	13.0	15	14	<0.02	<0.02	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	2.18	2.08	5	2.18	1.2	58	<0.02	<0.02	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01			0.01	<0.01	<0.01	0	<0.01	<0.01	0	25.0	27.3	9	25.0	27	8	<0.01	<0.01	0
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01				-	-	-	-	<0.01	-	-	-	-	-	<0.01	-	-	-	-	-
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
PFAS - Perfluoroalkyl Carboxylic Acids																	
Perfluorobutanoic acid (PFBA)	µg/L	0.05				<0.1	<0.1	0	<0.1	<0.05	0	0.2	0.2	0	0.2	0.25	22	<0.1	<0.1	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	3.62	3.83	6	3.62	2.4	41	<0.02	<0.02	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	0.66	0.67	2	0.66	0.50	28	<0.02	<0.02	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	0.36	0.38	5	0.36	0.33	9	<0.02	<0.02	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.56	10	19	<0.01	<0.01	0	<0.01	<0.01	0	1.11	1.17	5	1.11	0.93	18	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluorononanoic acid (PFNA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	0.02	0	<0.02	<0.02	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0
PFAS - Fluorotelomer Sulfonic Acids																	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	0.02	0	<0.05	<0.05	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0
PFAS - Perfluoroalkyl Sulfonamides																	
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS																	
Sum of PFHxS and PFOS	µg/L	0.01	0.07	2		<0.01	<0.01	0	<0.01	<0.01	0	38.0	40.5	6	38.0	42	10	<0.01	<0.01	0
Sum of PFAS (WA DER List)	µg/L	0.01				<0.01	<0.01	0	<0.01	<0.05	0	44.5	47.3	6	44.5	46.82	5	<0.01	<0.01	0
Sum of PFAS	µg/L	0.01				<0.01	<0.01	0	<0.01	<0.1	0	48.0	50.7	5	48.0	49.02	2	<0.01	<0.01	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01				-	-	-	-	<0.01	-	-	-	-	-	42.93	-	-	-	-
Sum of PFAS (PFOS + PFOA)	µg/L	0.01				-	-	-	-	<0.01	-	-	-	-	-	27.93	-	-	-	-
Inorganics																	
Carbonate Alkalinity (as CaCO3)	mg/L	1				<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0	<1	<1	0
Alkalinity (Bicarbonate as CaCO3)	mg/L	1				186	148	23	186	190	2	401	478	18	401	800	66	113	116	3
Alkalinity (Hydroxide) as CaCO3	mg/L	1				<1	<1	0	<1	-	-	<1	<1	0	<1	-	-	<1	<1	0
Alkalinity (total) as CaCO3	mg/L	1				186	148	23	186	-	-	401	478	18	401	-	-	113	116	3
Anions Total	meq/L	0.01				658	661	0	658	-	-	9.71	11.3	15	9.71	-	-	663	650	2
Cations Total	meq/L	0.01				725	707	3	725	-	-	10.0	9.79	2	10.0	-	-	739	735	1
Chloride	mg/L	1				21,000	21,100	0	21,000	19,000	10	36	36	0	36	59	48	21,200	20,800	2
Ionic Balance	%	0.01				4.79	3.34	36	4.79	-	-	1.63	7.12	125	1.63	-	-	5.43	6.07	11
Ammonia as N	mg/L	0.01				-	-	-	-	0.05	-	-	-	-	-	<0.01	-	-	-	-
Nitrate (as N)	mg/L	0.02				-	-	-	-	1.4	-	-	-	-	-	2.8	-	-	-	-
pH (Lab)	pH Units	0.01				7.77	7.78	0	7.77	7.8	0	7.60	7.62	0	7.60	7.7	1	8.01	7.99	0
Sodium	mg/L	0.5				-	-	-	-	11,000	-	-	-	-	-	23	-	-	-	-
Sodium (filtered)	mg/L	0.5				12,600	12,300	2	12,600	-	-	24	23	4	24	-	-	12,900	12,800	1
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1				3,000	3,020	1	3,000	-	-	33	35	6	33	-	-	3,000	2,950	2
Sulphate	mg/L	5				-	-	-	-	3,000	-	-	-	-	-	46	-	-	-	-
TDS	mg/L	10				43,300	43,400	0	43,300	48,000	10	604	604	0	604	520	15	43,200	41,500	4
TOC	mg/L	1				3	4	29	3	8.8	98	15	18	18	15	59	119	2	3	40
Total Suspended Solids	mg/L	1				85	115	30	85	120	34	1,250	878	35	1,250	1,100	13	12	43	113
Metals																	
Calcium	mg/L	0.5				-	-	-	-	530	-	-	-	-	-	82	-	-	-	-
Calcium (filtered)	mg/L	0.5				517	511	1	517	-	-	149	145	3	149	-	-	515	520	1
Magnesium	mg/L	0.5				-	-	-	-	1,400	-	-	-	-	-	18	-	-	-	-
Magnesium (filtered)	mg/L	0.5				1,620	1,570	3	1,620	-	-	18	18	0	18	-	-	1,630	1,630	0
Potassium	mg/L	0.5				-	-	-	-	420	-	-	-	-	-	2.8	-	-	-	-
Potassium (filtered)	mg/L	0.5				689	666	3	689	-	-	3	3	0	3	-	-	700	694	1

Location Code						SW156	SW156		MW112	MW112		MW112	MW112		PW358	PW358		PW358	PW358	
Field ID						0089_SW156_210316	0089_QC211_210316		0089_MW112_210316	0089_QC112_210316		0089_MW112_210316	0089_QC212_210316		0089_PW358_210316	0089_QC113_210316		0089_PW358_210316	0089_QC213_210316	
Lab Report Number						EP2102836	781350		EP2102833	EP2102833		EP2102833	781350		EP2102836	EP2102836		EP2102836	781350	
Date						16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD
	Unit	EQL	Human Health - Drinking Water	Human Health – Recreational Water	Ecological – 99% species protection															
PFAS - Perfluoroalkyl Sulfonic Acids																				
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01				-	<0.01	-	-	-	-	-	0.03	-	-	-	-	-	<0.01	-
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01				<0.02	<0.01	0	0.17	0.13	27	0.17	0.11	43	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01				<0.02	<0.01	0	1.52	1.00	41	1.52	0.43	112	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01				<0.02	<0.01	0	36.6	23.4	44	36.6	21	54	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01				<0.02	<0.01	0	5.00	3.07	48	5.00	2.7	60	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01			0.01	<0.01	0.02	67	14.4	16.0	11	14.4	20	33	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01				-	<0.01	-	-	-	-	-	<0.01	-	-	-	-	-	<0.01	-
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	µg/L	0.05				<0.1	<0.05	0	0.2	0.1	67	0.2	0.17	16	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01				<0.02	<0.01	0	3.59	2.43	39	3.59	2.1	52	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01				<0.02	<0.01	0	0.56	0.43	26	0.56	0.37	41	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01				<0.02	<0.01	0	0.64	0.49	27	0.64	0.44	37	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.56	10	19	<0.01	<0.01	0	4.28	3.39	23	4.28	2.6	49	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	0.03	40	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05				<0.05	<0.05	0	0.15	0.12	22	0.15	0.09	50	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02				<0.02	<0.05	0	0.14	0.21	40	0.14	0.21	40	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02				<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02				<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS																				
Sum of PFHxS and PFOS	µg/L	0.01	0.07	2		<0.01	0.02	67	51.0	39.4	26	51.0	41	22	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFAS (WA DER List)	µg/L	0.01				<0.01	<0.05	0	60.6	46.5	26	60.6	46.88	26	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFAS	µg/L	0.01				<0.01	<0.1	0	67.2	50.8	28	67.2	50.28	29	<0.01	<0.01	0	<0.01	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01				-	0.02	-	-	-	-	-	43.6	-	-	-	-	-	<0.01	-
Sum of PFAS (PFOS + PFOA)	µg/L	0.01				-	0.02	-	-	-	-	-	22.6	-	-	-	-	-	<0.01	-
Inorganics																				
Carbonate Alkalinity (as CaCO3)	mg/L	1				<1	<10	0	<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0
Alkalinity (Bicarbonate as CaCO3)	mg/L	1				113	130	14	211	213	1	211	320	41	131	137	4	131	170	26
Alkalinity (Hydroxide) as CaCO3	mg/L	1				<1	-	-	<1	<1	0	<1	-	-	<1	<1	0	<1	-	-
Alkalinity (total) as CaCO3	mg/L	1				113	-	-	211	213	1	211	-	-	131	137	4	131	-	-
Anions Total	meq/L	0.01				663	-	-	6.02	5.96	1	6.02	-	-	663	664	0	663	-	-
Cations Total	meq/L	0.01				739	-	-	6.54	6.42	2	6.54	-	-	689	736	7	689	-	-
Chloride	mg/L	1				21,200	23,000	8	38	37	3	38	49	25	21,200	21,200	0	21,200	19,000	11
Ionic Balance	%	0.01				5.43	-	-	4.19	3.70	12	4.19	-	-	1.92	5.12	91	1.92	-	-
Ammonia as N	mg/L	0.01				-	0.01	-	-	-	-	-	<0.01	-	-	-	-	-	0.14	-
Nitrate (as N)	mg/L	0.02				-	<0.02	-	-	-	-	-	5.8	-	-	-	-	-	0.78	-
pH (Lab)	pH Units	0.01				8.01	8.0	0	7.89	7.95	1	7.89	8.1	3	7.73	7.78	1	7.73	7.9	2
Sodium	mg/L	0.5				-	12,000	-	-	-	-	-	28	-	-	-	-	-	11,000	-
Sodium (filtered)	mg/L	0.5				12,900	-	-	25	24	4	25	-	-	12,000	12,800	6	12,000	-	-
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1				3,000	-	-	35	32	9	35	-	-	2,990	3,060	2	2,990	-	-
Sulphate	mg/L	5				-	3,100	-	-	-	-	-	41	-	-	-	-	-	3,100	-
TDS	mg/L	10				43,200	47,000	8	396	378	5	396	430	8	43,500	43,700	0	43,500	47,000	8
TOC	mg/L	1				2	6.3	104	2	4	67	2	11	138	5	4	22	5	12	82
Total Suspended Solids	mg/L	1				12	6,400	199	406	283	36	406	240	51	106	82	26	106	62	52
Metals																				
Calcium	mg/L	0.5				-	520	-	-	-	-	-	80	-	-	-	-	-	520	-
Calcium (filtered)	mg/L	0.5				515	-	-	88	87	1	88	-	-	489	529	8	489	-	-
Magnesium	mg/L	0.5				-	1,500	-	-	-	-	-	14	-	-	-	-	-	1,400	-
Magnesium (filtered)	mg/L	0.5				1,630	-	-	12	12	0	12	-	-	1,530	1,640	7	1,530	-	-
Potassium	mg/L	0.5				-	440	-	-	-	-	-	2.3	-	-	-	-	-	440	-
Potassium (filtered)	mg/L	0.5				700	-	-	3	2	40	3	-	-	646	704	9	646	-	-

Location Code						MW173	MW173		MW173	MW173		MW195D	MW195D		MW195D	MW195D		MW268	MW268				
Field ID						0089_MW173_210316	0089_QC114_210316		0089_MW173_210316	0089_QC214_210316		0089_MW195D_210316	0089_QC115_210316		0089_MW195D_210316	0089_QC215_210316		0089_MW268_210316	0089_QC116_210316				
Lab Report Number						EP2102833	EP2102833		EP2102833	781350		EP2102833	EP2102833		EP2102833	781350		EP2102837	EP2102837				
Date						16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD			
	Unit	EQL	Human Health - Drinking Water	Human Health – Recreational Water	Ecological – 99% species protection																		
PFAS - Perfluoroalkyl Sulfonic Acids																							
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01				-	-	-	-	0.06	-	-	-	-	-	<0.01	-	-	-	-			
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01				0.30	0.27	11	0.30	0.22	31	<0.02	0.02	0	<0.02	<0.01	0	0.05	0.04	22			
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01				0.32	0.33	3	0.32	0.20	46	<0.02	<0.02	0	<0.02	<0.01	0	0.06	0.05	18			
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01				4.02	4.49	11	4.02	5.1	24	<0.02	<0.02	0	<0.02	<0.01	0	0.30	0.26	14			
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01				0.74	0.76	3	0.74	0.41	57	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01			0.01	3.97	4.45	11	3.97	4.5	13	<0.01	0.01	0	<0.01	0.01	0	<0.01	<0.01	0			
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01				-	-	-	-	<0.01	-	-	-	-	-	<0.01	-	-	-	-			
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
PFAS - Perfluoroalkyl Carboxylic Acids																							
Perfluorobutanoic acid (PFBA)	µg/L	0.05				<0.1	<0.1	0	<0.1	0.12	18	<0.1	<0.1	0	<0.1	0.07	0	<0.1	<0.1	0			
Perfluorohexanoic acid (PFHxA)	µg/L	0.01				0.69	0.68	1	0.69	0.50	32	<0.02	0.18	160	<0.02	0.13	147	0.05	0.03	50			
Perfluoropentanoic acid (PFPeA)	µg/L	0.01				0.27	0.27	0	0.27	0.21	25	<0.02	0.26	171	<0.02	0.18	160	<0.02	<0.02	0			
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01				0.18	0.18	0	0.18	0.14	25	<0.02	0.14	150	<0.02	0.10	133	<0.02	<0.02	0			
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.56	10	19	0.63	0.63	0	0.63	0.50	23	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0			
Perfluorodecanoic acid (PFDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
Perfluorononanoic acid (PFNA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0			
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
PFAS - Fluorotelomer Sulfonic Acids																							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0			
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05				0.13	0.12	8	0.13	0.07	60	<0.05	0.36	151	<0.05	0.16	105	<0.05	<0.05	0			
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0			
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0			
PFAS - Perfluoroalkyl Sulfonamides																							
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0			
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0			
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0			
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0			
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0			
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0			
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0			
PFAS																							
Sum of PFHxS and PFOS	µg/L	0.01	0.07	2		7.99	8.94	11	7.99	9.6	18	<0.01	0.01	0	<0.01	0.01	0	0.30	0.26	14			
Sum of PFAS (WA DER List)	µg/L	0.01				10.2	11.1	8	10.2	11.36	11	<0.01	0.97	196	<0.01	0.65	194	0.40	0.33	19			
Sum of PFAS	µg/L	0.01				11.2	12.2	9	11.2	12.03	7	<0.01	0.97	196	<0.01	0.65	194	0.46	0.38	19			
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01				-	-	-	-	10.1	-	-	-	-	-	0.01	-	-	-	-			
Sum of PFAS (PFOS + PFOA)	µg/L	0.01				-	-	-	-	5	-	-	-	-	-	0.01	-	-	-	-			
Inorganics																							
Carbonate Alkalinity (as CaCO3)	mg/L	1				<1	<1	0	<1	<10	0	<1	<1	0	<1	<10	0	<1	<1	0			
Alkalinity (Bicarbonate as CaCO3)	mg/L	1				583	538	8	583	590	1	146	242	49	146	290	66	421	399	5			
Alkalinity (Hydroxide) as CaCO3	mg/L	1				<1	<1	0	<1	-	-	<1	<1	0	<1	-	-	<1	<1	0			
Alkalinity (total) as CaCO3	mg/L	1				583	538	8	583	-	-	146	242	49	146	-	-	421	399	5			
Anions Total	meq/L	0.01				40.4	39.6	2	40.4	-	-	418	251	50	418	-	-	116	143	21			
Cations Total	meq/L	0.01				38.4	38.8	1	38.4	-	-	436	242	57	436	-	-	119	145	20			
Chloride	mg/L	1				824	830	1	824	830	1	13,500	7,980	51	13,500	-	-	3,270	4,220	25			
Ionic Balance	%	0.01				2.49	1.06	81	2.49	-	-	2.11	1.86	13	2.11	-	-	1.54	0.80	63			
Ammonia as N	mg/L	0.01				-	-	-	-	0.04	-	-	-	-	-	<0.01	-	-	-	-			
Nitrate (as N)	mg/L	0.02				-	-	-	-	0.07	-	-	-	-	-	0.27	-	-	-	-			
pH (Lab)	pH Units	0.01				7.78	7.80	0	7.78	7.9	2	7.59	7.90	4	7.59	8.0	5	7.92	7.97	1			
Sodium	mg/L	0.5				-	-	-	-	550	-	-	-	-	-	4,300	-	-	-	-			
Sodium (filtered)	mg/L	0.5				565	567	0	565	-	-	7,390	4,000	60	7,390	-	-	1,890	2,400	24			
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1				264	263	0	264	-	-	1,670	1,020	48	1,670	-	-	730	772	6			
Sulphate	mg/L	5				-	-	-	-	280	-	-	-	-	-	-	-	-	-	-			
TDS	mg/L	10				2,210	2,210	0	2,210	2,100	5	26,400	15,500	52	26,400	14,000	61	7,250	9,330	25			
TOC	mg/L	1				29	19	42	29	35	19	<1	5	133	<1	15	175	16	11	37			
Total Suspended Solids	mg/L	1				98	70	33	98	53	60	448	62	151	448	140	105	72	110	42			
Metals																							
Calcium	mg/L	0.5				-	-	-	-	84	-	-	-	-	-	350	-	-	-	-			
Calcium (filtered)	mg/L	0.5				83	86	4	83	-	-	461	310	39	461	-	-	206	222	7			
Magnesium	mg/L	0.5				-	-	-	-	98	-	-	-	-	-	590	-	-	-	-			
Magnesium (filtered)	mg/L	0.5				104	106	2	104	-	-	1,000	574	54	1,000	-	-	292	326	11			
Potassium	mg/L	0.5				-	-	-	-	34	-	-	-	-	-	150	-	-	-	-			
Potassium (filtered)	mg/L	0.5				45	44	2	45	-	-	383	208	59	383	-	-	116	121	4			

Location Code						MW268	MW268		MW123	MW123		MW123	MW123	
Field ID						0089_MW268_210316	0089_QC216_210316		0089_MW123_210316	0089_QC108_210316		0089_MW123_210316	0089_QC208_210316	
Lab Report Number						EP2102837	781350		EP2102833	EP2102833		EP2102833	781350	
Date						16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD	16/03/2021	16/03/2021	RPD
	Unit	EQL	Human Health - Drinking Water	Human Health – Recreational Water	Ecological – 99% species protection									
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01				-	0.01	-	-	-	-	-	0.03	-
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01				0.05	0.03	50	0.11	0.11	0	0.11	0.08	32
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01				0.06	0.05	18	0.08	0.09	12	0.08	0.08	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01				0.30	0.31	3	0.48	0.49	2	0.48	0.44	9
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01			0.01	<0.01	<0.01	0	0.05	0.06	18	0.05	0.03	50
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01				-	<0.01	-	-	-	-	-	<0.01	-
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05				<0.1	<0.05	0	<0.1	<0.1	0	<0.1	0.07	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01				0.05	0.04	22	0.47	0.48	2	0.47	0.38	21
Perfluoropentanoic acid (PFPeA)	µg/L	0.01				<0.02	<0.01	0	0.13	0.13	0	0.13	0.11	17
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01				<0.02	<0.01	0	0.03	0.03	0	0.03	0.03	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.56	10	19	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01				<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01				<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02				<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02				<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02				<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFHxS and PFOS	µg/L	0.01	0.07	2		0.30	0.31	3	0.53	0.55	4	0.53	0.47	12
Sum of PFAS (WA DER List)	µg/L	0.01				0.40	0.38	5	1.27	1.30	2	1.27	1.14	11
Sum of PFAS	µg/L	0.01				0.46	0.44	4	1.35	1.39	3	1.35	1.25	8
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01				-	0.31	-	-	-	-	-	0.47	-
Sum of PFAS (PFOS + PFOA)	µg/L	0.01				-	<0.01	-	-	-	-	-	0.03	-
Inorganics														
Carbonate Alkalinity (as CaCO3)	mg/L	1				<1	<10	0	<1	<1	0	<1	<10	0
Alkalinity (Bicarbonate as CaCO3)	mg/L	1				421	460	9	191	218	13	191	670	111
Alkalinity (Hydroxide) as CaCO3	mg/L	1				<1	-	-	<1	<1	0	<1	-	-
Alkalinity (total) as CaCO3	mg/L	1				421	-	-	191	218	13	191	-	-
Anions Total	meq/L	0.01				116	-	-	5.29	5.88	11	5.29	-	-
Cations Total	meq/L	0.01				119	-	-	5.72	5.77	1	5.72	-	-
Chloride	mg/L	1				3,270	3,100	5	47	48	2	47	64	31
Ionic Balance	%	0.01				1.54	-	-	3.96	0.94	123	3.96	-	-
Ammonia as N	mg/L	0.01				-	<0.01	-	-	-	-	-	<0.01	-
Nitrate (as N)	mg/L	0.02				-	4.9	-	-	-	-	-	0.30	-
pH (Lab)	pH Units	0.01				7.92	8.3	5	7.93	7.87	1	7.93	8.0	1
Sodium	mg/L	0.5				-	1,700	-	-	-	-	-	25	-
Sodium (filtered)	mg/L	0.5				1,890	-	-	26	27	4	26	-	-
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1				730	-	-	7	8	13	7	-	-
Sulphate	mg/L	5				-	700	-	-	-	-	-	12	-
TDS	mg/L	10				7,250	6,700	8	319	356	11	319	-	-
TOC	mg/L	1				16	22	32	6	6	0	6	13	74
Total Suspended Solids	mg/L	1				72	100	33	179	680	117	179	590	107
Metals														
Calcium	mg/L	0.5				-	180	-	-	-	-	-	69	-
Calcium (filtered)	mg/L	0.5				206	-	-	74	74	0	74	-	-
Magnesium	mg/L	0.5				-	250	-	-	-	-	-	9.7	-
Magnesium (filtered)	mg/L	0.5				292	-	-	10	10	0	10	-	-
Potassium	mg/L	0.5				-	68	-	-	-	-	-	2.2	-
Potassium (filtered)	mg/L	0.5				116	-	-	3	3	0	3	-	-

Table 5: Relative Percentage Difference Results (soil samples)

Location Code						SD368	SD368			SD368	SD368			SD374	SD374			SD374	SD374			SD308	SD308			SD308	SD308		
Field ID						0089_SD368_210315	0089_QC101_210315			0089_SD368_210315	SD368			0089_SD374_210315	0089_QC105_210315			0089_SD374_210315	0089_QC205_210315			0089_SD308_210317	0089_QC117_210317			0089_SD308_210317	0089_QC217_210317		
Lab Report Number						EP2102757	EP2102757			EP2102757	781350			EP2102757	EP2102757			EP2102757	781350			EP2102888	EP2102888			EP2102888	782088		
Date						15/03/2021	15/03/2021			15/03/2021	15/03/2021			15/03/2021	15/03/2021			15/03/2021	15/03/2021			17/03/2021	17/03/2021			17/03/2021	17/03/2021		
	Unit	EQL	Ecological - Direct Exposure	Ecological - Indirect Exposure	Human Health - Commercial/Industrial			RPD				RPD				RPD				RPD				RPD				RPD
PFAS - Perfluoroalkyl Sulfonic Acids																														
Perfluoropropanesulfonic acid (PFPrS)	mg/kg	0.005				-	-	-		-	<0.005	-		-	-	-		-	<0.005	-		-	-	-		-	<0.005	-	
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	1	0.01		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluorononanesulfonic acid (PFNS)	mg/kg	0.005				-	-	-		-	<0.005	-		-	-	-		-	<0.005	-		-	-	-		-	<0.005	-	
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
PFAS - Perfluoroalkyl Carboxylic Acids																														
Perfluorobutanoic acid (PFBA)	mg/kg	0.001				<0.001	<0.001	0		<0.001	<0.005	0		<0.001	<0.001	0		<0.001	<0.005	0		<0.001	<0.001	0		<0.001	<0.005	0	
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	10		50	<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluorononanoic acid (PFNA)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005				<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0	
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
PFAS - Fluorotelomer Sulfonic Acids																														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005				<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005				<0.0005	<0.0005	0		<0.0005	<0.01	0		<0.0005	<0.0005	0		<0.0005	<0.01	0		<0.0005	<0.0005	0		<0.0005	<0.01	0	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005				<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005				<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0	
PFAS - Perfluoroalkyl Sulfonamides																														
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005				<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.01	0		<0.0002	<0.0002	0		<0.0002	<0.01	0		<0.0002	<0.0002	0		<0.0002	<0.01	0	
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005				<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005				<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.01	0		<0.0002	<0.0002	0		<0.0002	<0.01	0		<0.0002	<0.0002	0		<0.0002	<0.01	0	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005				<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0		<0.0005	<0.0005	0		<0.0005	<0.005	0	
PFAS																														
Sum of PFHxS and PFOS	mg/kg	0.0002			20	<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0		<0.0002	<0.0002	0		<0.0002	<0.005	0	
Sum of PFAS (WA DER List)	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.01	0		<0.0002	<0.0002	0		<0.0002	<0.01	0		<0.0002	<0.0002	0		<0.0002	<0.01	0	
Sum of PFAS	mg/kg	0.0002				<0.0002	<0.0002	0		<0.0002	<0.05	0		<0.0002	<0.0002	0		<0.0002	<0.05	0		<0.0002	<0.0002	0		<0.0002	<0.05	0	
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	mg/kg	0.005				-	-	-		-	<0.005	-		-	-	-		-	<0.005	-		-	-	-		-	<0.005	-	
Sum of PFAS (PFOS + PFOA)	mg/kg	0.005				-	-	-		-	<0.005	-		-	-	-		-	<0.005	-		-	-	-		-	<0.005	-	
Inorganics																														
Conductivity (1:5 aqueous extract)	µS/cm	10				-	-	-		-	3,300	-		-	-	-		-	1,900	-		-	-	-		-	1,700	-	
Exchangeable Sodium Percent	%	0.1				2.8	2.9	4		2.8	-	-		1.3	3.9	100		1.3	-	-		5.1	4.5	12		5.1	-	-	
pH (1:5 Aqueous extract at 25ÂºC as rec.)	pH Units	0.1				-	-	-		-	7.9	-		-	-	-		-	8.1	-		-	-	-		-	9.3	-	
Moisture Content	%	0.1				25.8	25.2	2		25.8	24	7		17.5	18.6	6		17.5	14	22		17.1	8.0	73		17.1	11	43	
Exchangeable Calcium	meq/100g	0.1				3.0	2.5	18		3.0	-	-		13.5	2.4	140		13.5	-	-		2.2	2.5	13		2.2	-	-	
Exchangeable Magnesium	meq/100g	0.1				0.4	0.4	0		0.4	-	-		1.3	0.4	106		1.3	-	-		0.3	0.3	0		0.3	-	-	
Exchangeable Potassium	meq/100g	0.1				<0.1	<0.1	0		<0.1	-	-		<0.1	<0.1	0		<0.1	-	-		<0.1	<0.1	0		<0.1	-	-	
Exchangeable Sodium	meq/100g	0.1				<0.1	<0.1	0		<0.1	-	-		0.2	0.1	67		0.2	-	-		0.1	0.1	0		0.1	-	-	
CEC	meq/100g	0.05				3.5	3.0	15		3.5	31	159		15.0	3.0	133		15.0	27	57		2.7	2.9	7		2.7	29	166	
Electrical conductivity * (lab)	µS/cm	1				2,550	3,060	18		2,550	-	-		2,510	2,880	14		2,510	-	-		2,350	1,260	60		2,350	-	-	
pH (Lab)	pH Units	0.1				8.7	8.7	0		8.7	-	-		8.8	8.8	0		8.8	-	-		9.4	9.6	2		9.4	-	-	
TOC	mg/kg	1,000				-	-	-		-	52,000	-		-	-	-		-	16,000	-		-	-	-		-	<1,000	-	
Organic																														
Organic Matter	%	0.5				<0.5	<0.5	0		<0.5	-	-		0.6	<0.5	18		0.6	-	-		<0.5	<0.5	0		<0.5	-	-	

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: No limit (1 - 10 x EQL); 50 (10 - 20 x EQL); 20 (> 20 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory
EQL - Estimated Quantitation Limit

APPENDIX

C

LABORATORY CERTIFICATES

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☐ **Melbourne**
2 Kingston Town Close, Oakleigh, VIC 3166
Phone: +613 8564 5000 Fax: +613 8564 5090
Email: enquiries.melb@mgtlabmark.com.au

CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Company Name : Cardno (WA) Pty Ltd	Contact Name : [redacted]	Purchase Order : DEF19009/730	COC Number : -01
Office Address : 11 Harvest Terrace, West perth, WA, 6005		PROJECT Number : WA_0089_PFASOMP	Eurofins | mgt quote ID : NA
	Email for COC/SRN/Results : [redacted]	PROJECT Name : HMAS Stirling PFAS OMP	Data output format: PDF; ESDAT

Special Directions & Comments :
Please send Esdat reports to [redacted] with the project ID in the header file
Please send invoice to [redacted]

Eurofins | mgt DI water batch number:

Some common holding times (with correct preservation).
For further information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous iron	7 days	ASLP, TCLP	7 days

	Sample ID	Date	Matrix	Analytes: PFAS full suite soil	PFAS full suite Water	TOC, TSS, TDS, pH	TOC, CEC, pH	Anions, Cations	Containers: 1LP	250P	125P	20P	40mL vial	125mL A	Jar	Sample comments:
1	0089_QC201_210315	15/03/2021	Soil	x			x								2	
2	0089_QC202_210315	15/03/2021	Water		x	x		x			1	2	1			
3	0089_QC203_210315	15/03/2021	Water		x	x		x			1	2	1			
4	0089_QC204_210315	15/03/2021	Water		x	x		x			1	2	1			
5	0089_QC205_210315	15/03/2021	Soil	x			x								2	
6	0089_QC206_210315	15/03/2021	Water		x	x		x			1	2	1			
7	0089_QC207_210315	15/03/2021	Water		x	x		x			1	2	1			
8	0089_QC208_210316	16/03/2021	Water		x	x		x			1	2	1			
9	0089_QC209_210316	16/03/2021	Water		x	x		x			1	2	1			
10	0089_QC210_210316	16/03/2021	Water		x	x		x			1	2	1			
11	0089_QC211_210316	16/03/2021	Water		x	x		x			1	2	1			
12	0089_QC212_210316	16/03/2021	Water		x	x		x			1	2	1			
13	0089_QC213_210316	16/03/2021	Water		x	x		x			1	2	1			
14	0089_QC214_210316	16/03/2021	Water		x	x		x			1	2	1			
15	0089_QC215_210316	16/03/2021	Water		x	x		x			1	2	1			
16	0089_QC216_210316	16/03/2021	Water		x	x		x			1	2	1			

Laboratory Staff

Relinquished By:
Date & Time :
Signature:

Received By: [redacted]
Date & Time : 17/3/21 8:39am
Signature: [redacted]

Turn around time

1 DAY ☐ 2 DAY ☐ 3 DAY ☐
STANDARD ☑ Other:

Method Of Shipment

☑ Courier
☐ Hand Delivered
☐ Postal
Courier Consignment # :

Temperature on arrival: 15.7°C

Report number: 781350

[redacted]

Date/Time: 17/3/21 8:39am
Chilled: Yes No
Temp: 16.8 15.4
Correction: -0.1
Final Temp: 15.7°C

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ABN: 50 005 085 521 www.eurofins.com.au EnviroSales@eurofins.com

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IANZ # 1290

Sample Receipt Advice

Company name:	Cardno (WA)
Contact name:	[redacted]
Project name:	HMAS STIRLING PFAS OMP
Project ID:	WA_0089_PFASOMP
Turnaround time:	5 Day
Date/Time received	Mar 17, 2021 8:39 PM
Eurofins reference	781350

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Received 2x QC214 instead of QC215.
Samples received by the laboratory after 5.30pm are deemed to have been received the following working day.

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Rhys Thomas on phone : (+61) 8 9251 9602 or by email: [redacted]@eurofins.com

Results will be delivered electronically via email to [redacted] - [redacted]

Note: A copy of these results will also be delivered to the general Cardno (WA) email address.

Global Leader - Results you can trust

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IANZ # 1290

Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING PFAS OMP
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 781350
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Mar 17, 2021 8:39 PM
Due: Mar 25, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794													X	
Perth Laboratory - NATA Site # 23736														
Mayfield Laboratory														
External Laboratory														
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**									
1	0089_QC201_210315	Mar 15, 2021		Soil	M21-Ma34211	X		X			X	X	X	
2	0089_QC202_210315	Mar 15, 2021		Water	M21-Ma34212		X	X	X	X			X	X
3	0089_QC203_210315	Mar 15, 2021		Water	M21-Ma34213		X	X	X	X			X	X
4	0089_QC204_210315	Mar 15, 2021		Water	M21-Ma34214		X	X	X	X			X	X
5	0089_QC205_210315	Mar 15, 2021		Soil	M21-Ma34215	X		X			X	X	X	
6	0089_QC206_	Mar 15, 2021		Water	M21-Ma34216		X	X	X	X			X	X

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING PFAS OMP
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 781350
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Mar 17, 2021 8:39 PM
Due: Mar 25, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794													X	
Perth Laboratory - NATA Site # 23736														
Mayfield Laboratory														
External Laboratory														
	210315													
7	0089_QC207_210315	Mar 15, 2021		Water	M21-Ma34217		X	X	X	X			X	X
8	0089_QC208_210316	Mar 16, 2021		Water	M21-Ma34218		X	X	X	X			X	X
9	0089_QC209_210316	Mar 16, 2021		Water	M21-Ma34219		X	X	X	X			X	X
10	0089_QC210_210316	Mar 16, 2021		Water	M21-Ma34220		X	X	X	X			X	X
11	0089_QC211_210316	Mar 16, 2021		Water	M21-Ma34221		X	X	X	X			X	X
12	0089_QC212_210316	Mar 16, 2021		Water	M21-Ma34222		X	X	X	X			X	X

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING PFAS OMP
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 781350
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Mar 17, 2021 8:39 PM
Due: Mar 25, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794													X	
Perth Laboratory - NATA Site # 23736														
Mayfield Laboratory														
External Laboratory														
13	0089_QC213_210316	Mar 16, 2021		Water	M21-Ma34223		X	X	X	X			X	X
14	0089_QC214_210316 (A)	Mar 16, 2021		Water	M21-Ma34224		X	X	X	X			X	X
15	0089_QC214_210316 (B)	Mar 16, 2021		Water	M21-Ma34225		X	X	X	X			X	X
16	0089_QC216_210316	Mar 16, 2021		Water	M21-Ma34226		X	X	X	X			X	X
Test Counts						2	14	16	14	14	2	2	16	14

Cardno Consulting WA
11 Harvest Terrace
West Perth
WA 6005

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Attention: [redacted]

Report **781350-S**
Project name HMAS STIRLING PFAS OMP
Project ID WA_0089_PFASOMP
Received Date Mar 17, 2021

Client Sample ID			**0089_QC201_210315**	**0089_QC205_210315**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**M21-Ma34211**	**M21-Ma34215**
Date Sampled			**Mar 15, 2021**	**Mar 15, 2021**
Test/Reference	LOR	Unit		
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	3300	1900
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	7.9	8.1
Total Organic Carbon	0.1	%	5.2	1.6
% Moisture	1	%	24	14
Cation Exchange Capacity				
Cation Exchange Capacity	0.05	meq/100g	31	27
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5	< 5
13C4-PFBA (surr.)	1	%	23	24
13C5-PFPeA (surr.)	1	%	34	26
13C5-PFHxA (surr.)	1	%	38	27
13C4-PFHpA (surr.)	1	%	43	28
13C8-PFOA (surr.)	1	%	49	38
13C5-PFNA (surr.)	1	%	51	54
13C6-PFDA (surr.)	1	%	70	90
13C2-PFUnDA (surr.)	1	%	82	89
13C2-PFDoDA (surr.)	1	%	76	85
13C2-PFTeDA (surr.)	1	%	70	174
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	5	ug/kg	< 5	< 5

Client Sample ID			0089_QC201_210315	0089_QC205_210315
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**M21-Ma34211**	**M21-Ma34215**
Date Sampled			**Mar 15, 2021**	**Mar 15, 2021**
Test/Reference	LOR	Unit		
Perfluoroalkyl sulfonamido substances				
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	5	ug/kg	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10	< 10
13C8-FOSA (surr.)	1	%	79	85
D3-N-MeFOSA (surr.)	1	%	86	113
D5-N-EtFOSA (surr.)	1	%	105	INT
D7-N-MeFOSE (surr.)	1	%	65	78
D9-N-EtFOSE (surr.)	1	%	67	98
D5-N-EtFOSAA (surr.)	1	%	78	88
D3-N-MeFOSAA (surr.)	1	%	71	82
Perfluoroalkyl sulfonic acids (PFSAs)				
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	< 5
13C3-PFBS (surr.)	1	%	61	51
18O2-PFHxS (surr.)	1	%	85	83
13C8-PFOS (surr.)	1	%	93	100
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	< 5
13C2-4:2 FTS (surr.)	1	%	14	INT
13C2-6:2 FTSA (surr.)	1	%	25	18
13C2-8:2 FTSA (surr.)	1	%	26	65
13C2-10:2 FTSA (surr.)	1	%	57	64
PFASs Summations				
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Conductivity (1:5 aqueous extract at 25°C as rec.)	Melbourne	Mar 19, 2021	7 Days
- Method: LTM-INO-4030 Conductivity			
Cation Exchange Capacity	Melbourne	Mar 20, 2021	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage			
pH (1:5 Aqueous extract at 25°C as rec.)	Melbourne	Mar 19, 2021	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Total Organic Carbon	Melbourne	Mar 20, 2021	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			
% Moisture	Melbourne	Mar 18, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Mar 23, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Mar 23, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Mar 23, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Mar 23, 2021	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

eurofins | Environment Testing

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING PFAS OMP
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 781350
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Mar 17, 2021 8:39 PM
Due: Mar 25, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794													X	
Perth Laboratory - NATA Site # 23736														
Mayfield Laboratory														
External Laboratory														
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**									
1	0089_QC201_210315	Mar 15, 2021		Soil	M21-Ma34211	X		X			X	X	X	
2	0089_QC202_210315	Mar 15, 2021		Water	M21-Ma34212		X	X	X	X			X	X
3	0089_QC203_210315	Mar 15, 2021		Water	M21-Ma34213		X	X	X	X			X	X
4	0089_QC204_210315	Mar 15, 2021		Water	M21-Ma34214		X	X	X	X			X	X
5	0089_QC205_210315	Mar 15, 2021		Soil	M21-Ma34215	X		X			X	X	X	
6	0089_QC206_	Mar 15, 2021		Water	M21-Ma34216		X	X	X	X			X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794													X	
Perth Laboratory - NATA Site # 23736														
Mayfield Laboratory														
External Laboratory														
	210315													
7	0089_QC207_210315	Mar 15, 2021		Water	M21-Ma34217		X	X	X	X			X	X
8	0089_QC208_210316	Mar 16, 2021		Water	M21-Ma34218		X	X	X	X			X	X
9	0089_QC209_210316	Mar 16, 2021		Water	M21-Ma34219		X	X	X	X			X	X
10	0089_QC210_210316	Mar 16, 2021		Water	M21-Ma34220		X	X	X	X			X	X
11	0089_QC211_210316	Mar 16, 2021		Water	M21-Ma34221		X	X	X	X			X	X
12	0089_QC212_210316	Mar 16, 2021		Water	M21-Ma34222		X	X	X	X			X	X

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Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794													X	
Perth Laboratory - NATA Site # 23736														
Mayfield Laboratory														
External Laboratory														
13	0089_QC213_210316	Mar 16, 2021		Water	M21-Ma34223		X	X	X	X			X	X
14	0089_QC214_210316 (A)	Mar 16, 2021		Water	M21-Ma34224		X	X	X	X			X	X
15	0089_QC214_210316 (B)	Mar 16, 2021		Water	M21-Ma34225		X	X	X	X			X	X
16	0089_QC216_210316	Mar 16, 2021		Water	M21-Ma34226		X	X	X	X			X	X
Test Counts						2	14	16	14	14	2	2	16	14

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Organic Carbon	%	< 0.1			0.1	Pass	
Method Blank							
Cation Exchange Capacity							
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass	
LCS - % Recovery							
Total Organic Carbon	%	101			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	S21-Ma32954	NCP	%	98			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S21-Ma32954	NCP	%	92			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S21-Ma32954	NCP	%	97			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S21-Ma32954	NCP	%	94			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S21-Ma32954	NCP	%	93			50-150	Pass	
Perfluorononanoic acid (PFNA)	S21-Ma32954	NCP	%	98			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S21-Ma32954	NCP	%	90			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S21-Ma32954	NCP	%	100			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S21-Ma32954	NCP	%	112			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S21-Ma32954	NCP	%	107			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S21-Ma32954	NCP	%	102			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S21-Ma32954	NCP	%	101			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S21-Ma32954	NCP	%	103			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S21-Ma32954	NCP	%	93			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S21-Ma32954	NCP	%	107			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S21-Ma32954	NCP	%	88			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S21-Ma32954	NCP	%	99			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S21-Ma32954	NCP	%	96			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S21-Ma32954	NCP	%	72			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S21-Ma32954	NCP	%	92			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S21-Ma32954	NCP	%	86			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S21-Ma32954	NCP	%	94			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S21-Ma32954	NCP	%	86			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S21-Ma32954	NCP	%	106			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctanesulfonic acid (PFOS)	S21-Ma32954	NCP	%	91			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S21-Ma32954	NCP	%	64			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S21-Ma32954	NCP	%	96			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S21-Ma32954	NCP	%	98			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S21-Ma32954	NCP	%	90			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S21-Ma32954	NCP	%	95			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C as rec.)	M21-Ma33810	NCP	uS/cm	470	460	2.9	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	M21-Ma33810	NCP	pH Units	7.7	7.8	pass	30%	Pass	
Total Organic Carbon	M21-Ma34211	CP	%	5.2	5.0	4.9	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Ma34211	CP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Ma34211	CP	ug/kg	< 10	< 10	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M21-Ma34211	CP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M21-Ma34211	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M21-Ma34215	CP	%	14	16	12	30%	Pass	

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WA 6005

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Attention: [redacted]

Report **781350-W**
Project name HMAS STIRLING PFAS OMP
Project ID WA_0089_PFASOMP
Received Date Mar 17, 2021

Client Sample ID			**0089_QC202_210315**	**0089_QC203_210315**	**0089_QC204_210315**	**0089_QC206_210315**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M21-Ma34212**	**M21-Ma34213**	**M21-Ma34214**	**M21-Ma34216**
Date Sampled			**Mar 15, 2021**	**Mar 15, 2021**	**Mar 15, 2021**	**Mar 15, 2021**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.15	0.03	0.32	0.11
Chloride	1	mg/L	21000	19000	43	21000
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	0.04	0.45
pH (at 25 °C)	0.1	pH Units	7.8	8.0	8.2	7.9
Sulphate (as SO4)	5	mg/L	3200	3100	7.4	3100
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	40000	59000	270	56000
Total Organic Carbon	5	mg/L	6.3	6.2	9.6	12
Total Suspended Solids Dried at 103–105°C	1	mg/L	86	620	180	210
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	120	140	150	140
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Alkali Metals						
Calcium	0.5	mg/L	690	560	41	530
Magnesium	0.5	mg/L	1900	1500	5.7	1400
Potassium	0.5	mg/L	560	450	2.5	430
Sodium	0.5	mg/L	15000	12000	16	13000
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	< 0.01	0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	[N09]0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	98	104	92	99
13C5-PFPeA (surr.)	1	%	86	90	77	87
13C5-PFHxA (surr.)	1	%	92	103	83	91
13C4-PFHpA (surr.)	1	%	92	100	85	98
13C8-PFOA (surr.)	1	%	76	86	75	81
13C5-PFNA (surr.)	1	%	92	85	78	88
13C6-PFDA (surr.)	1	%	83	81	64	81

Client Sample ID			0089_QC202_210315	0089_QC203_210315	0089_QC204_210315	0089_QC206_210315
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ma34212	M21-Ma34213	M21-Ma34214	M21-Ma34216
Date Sampled			Mar 15, 2021	Mar 15, 2021	Mar 15, 2021	Mar 15, 2021
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C2-PFUnDA (surr.)	1	%	77	79	58	82
13C2-PFDoDA (surr.)	1	%	83	84	63	91
13C2-PFTeDA (surr.)	1	%	112	112	76	118
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	101	106	91	98
D3-N-MeFOSA (surr.)	1	%	106	103	83	100
D5-N-EtFOSA (surr.)	1	%	93	90	76	89
D7-N-MeFOSE (surr.)	1	%	135	133	104	135
D9-N-EtFOSE (surr.)	1	%	109	114	92	113
D5-N-EtFOSAA (surr.)	1	%	79	53	14	47
D3-N-MeFOSAA (surr.)	1	%	78	57	14	47
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	[N09]0.02	[N09]0.11	[N09]0.07
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]0.02	[N09]0.10	[N09]0.10	[N09]0.04
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	105	95	94	93
18O2-PFHxS (surr.)	1	%	101	90	85	91
13C8-PFOS (surr.)	1	%	87	100	79	94
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	83	83	74	97
13C2-6:2 FTSA (surr.)	1	%	64	57	58	65
13C2-8:2 FTSA (surr.)	1	%	81	75	60	78
13C2-10:2 FTSA (surr.)	1	%	89	83	66	95

Client Sample ID			0089_QC202_210315	0089_QC203_210315	0089_QC204_210315	0089_QC206_210315
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ma34212	M21-Ma34213	M21-Ma34214	M21-Ma34216
Date Sampled			Mar 15, 2021	Mar 15, 2021	Mar 15, 2021	Mar 15, 2021
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	0.02	0.12	0.21	0.11
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.02	0.1	0.1	0.05
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.02	0.12	0.21	0.12
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	0.12	0.22	0.13
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	0.12	0.22	0.13

Client Sample ID			0089_QC207_210315	0089_QC208_210316	0089_QC209_210316	0089_QC210_210316
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ma34217	M21-Ma34218	M21-Ma34219	M21-Ma34220
Date Sampled			Mar 15, 2021	Mar 16, 2021	Mar 16, 2021	Mar 16, 2021
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.09	< 0.01	< 0.01	0.05
Chloride	1	mg/L	19000	64	59	19000
Nitrate (as N)	0.02	mg/L	< 0.02	0.30	2.8	1.4
pH (at 25 °C)	0.1	pH Units	8.3	8.0	7.7	7.8
Sulphate (as SO4)	5	mg/L	3100	12	46	3000
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	56000	[R10]-	520	48000
Total Organic Carbon	5	mg/L	8.0	13	59	8.8
Total Suspended Solids Dried at 103–105°C	1	mg/L	16	590	1100	120
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	130	670	800	190
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Alkali Metals						
Calcium	0.5	mg/L	450	69	82	530
Magnesium	0.5	mg/L	1400	9.7	18	1400
Potassium	0.5	mg/L	470	2.2	2.8	420
Sodium	0.5	mg/L	12000	25	23	11000
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	0.07	0.25	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	0.11	0.50	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	0.38	2.4	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	[N09]0.03	[N09]0.33	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01	[N09]0.93	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	[N09]0.02	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	101	102	73	104
13C5-PFPeA (surr.)	1	%	84	81	51	81
13C5-PFHxA (surr.)	1	%	91	82	114	95
13C4-PFHpA (surr.)	1	%	97	89	64	101
13C8-PFOA (surr.)	1	%	80	77	33	89
13C5-PFNA (surr.)	1	%	87	82	59	91
13C6-PFDA (surr.)	1	%	78	77	21	93

Client Sample ID			0089_QC207_210315	0089_QC208_210316	0089_QC209_210316	0089_QC210_210316
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ma34217	M21-Ma34218	M21-Ma34219	M21-Ma34220
Date Sampled			Mar 15, 2021	Mar 16, 2021	Mar 16, 2021	Mar 16, 2021
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C2-PFUnDA (surr.)	1	%	64	73	44	92
13C2-PFDoDA (surr.)	1	%	76	72	81	98
13C2-PFTeDA (surr.)	1	%	82	107	99	131
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	92	103	92	107
D3-N-MeFOSA (surr.)	1	%	91	111	90	112
D5-N-EtFOSA (surr.)	1	%	78	101	82	101
D7-N-MeFOSE (surr.)	1	%	119	140	109	147
D9-N-EtFOSE (surr.)	1	%	98	116	101	122
D5-N-EtFOSAA (surr.)	1	%	47	23	38	88
D3-N-MeFOSAA (surr.)	1	%	50	24	34	82
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	0.08	0.39	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	0.03	0.14	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	[N09]0.08	[N09]0.84	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	[N09]0.44	[N09]15	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	[N09]1.2	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	[N09]0.03	[N09]27	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	98	94	70	99
18O2-PFHxS (surr.)	1	%	95	85	71	98
13C8-PFOS (surr.)	1	%	90	97	60	112
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	0.02	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	80	74	77	83
13C2-6:2 FTSA (surr.)	1	%	55	63	91	64
13C2-8:2 FTSA (surr.)	1	%	70	69	76	87
13C2-10:2 FTSA (surr.)	1	%	66	76	83	99

Client Sample ID			0089_QC207_210315	0089_QC208_210316	0089_QC209_210316	0089_QC210_210316
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ma34217	M21-Ma34218	M21-Ma34219	M21-Ma34220
Date Sampled			Mar 15, 2021	Mar 16, 2021	Mar 16, 2021	Mar 16, 2021
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	0.47	42	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	0.03	27.93	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	0.47	42.93	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	1.14	46.82	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	1.25	49.02	< 0.1

Client Sample ID			0089_QC211_210316	0089_QC212_210316	0089_QC213_210316	0089_QC214_210316 (A)
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ma34221	M21-Ma34222	M21-Ma34223	M21-Ma34224
Date Sampled			Mar 16, 2021	Mar 16, 2021	Mar 16, 2021	Mar 16, 2021
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.01	< 0.01	0.14	0.04
Chloride	1	mg/L	23000	49	19000	830
Nitrate (as N)	0.02	mg/L	< 0.02	5.8	0.78	0.07
pH (at 25 °C)	0.1	pH Units	8.0	8.1	7.9	7.9
Sulphate (as SO4)	5	mg/L	3100	41	3100	280
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	47000	430	47000	2100
Total Organic Carbon	5	mg/L	6.3	11	12	35
Total Suspended Solids Dried at 103–105°C	1	mg/L	6400	240	62	53
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	130	320	170	590
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Alkali Metals						
Calcium	0.5	mg/L	520	80	520	84
Magnesium	0.5	mg/L	1500	14	1400	98
Potassium	0.5	mg/L	440	2.3	440	34
Sodium	0.5	mg/L	12000	28	11000	550
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	0.17	< 0.05	0.12
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	0.37	< 0.01	0.21
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	2.1	< 0.01	0.50
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	[N09]0.44	< 0.01	[N09]0.14
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	[N09]2.6	< 0.01	[N09]0.50
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	[N09]0.03	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	105	62	103	83
13C5-PFPeA (surr.)	1	%	80	56	83	70
13C5-PFHxA (surr.)	1	%	96	98	94	71
13C4-PFHpA (surr.)	1	%	95	65	88	85
13C8-PFOA (surr.)	1	%	83	62	80	50
13C5-PFNA (surr.)	1	%	92	43	90	74
13C6-PFDA (surr.)	1	%	82	28	77	46

Client Sample ID			0089_QC211_210316	0089_QC212_210316	0089_QC213_210316	0089_QC214_210316 (A)
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Ma34221	M21-Ma34222	M21-Ma34223	M21-Ma34224
Date Sampled			Mar 16, 2021	Mar 16, 2021	Mar 16, 2021	Mar 16, 2021
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C2-PFUnDA (surr.)	1	%	76	33	74	64
13C2-PFDoDA (surr.)	1	%	84	67	78	85
13C2-PFTeDA (surr.)	1	%	102	118	99	115
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	0.21	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	98	102	95	102
D3-N-MeFOSA (surr.)	1	%	96	104	89	92
D5-N-EtFOSA (surr.)	1	%	85	93	79	85
D7-N-MeFOSE (surr.)	1	%	122	126	116	121
D9-N-EtFOSE (surr.)	1	%	104	109	101	105
D5-N-EtFOSAA (surr.)	1	%	64	[N09]13	39	22
D3-N-MeFOSAA (surr.)	1	%	62	INT	37	20
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	0.11	< 0.01	0.22
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	0.03	< 0.01	0.06
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	[N09]0.43	< 0.01	[N09]0.20
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	[N09]21	< 0.01	[N09]5.1
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	[N09]2.7	< 0.01	[N09]0.41
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]0.02	[N09]20	< 0.01	[N09]4.5
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	92	83	95	83
18O2-PFHxS (surr.)	1	%	93	66	95	74
13C8-PFOS (surr.)	1	%	96	63	97	77
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	0.09	< 0.05	0.07
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	84	52	72	74
13C2-6:2 FTSA (surr.)	1	%	73	39	52	59
13C2-8:2 FTSA (surr.)	1	%	84	39	69	64
13C2-10:2 FTSA (surr.)	1	%	97	52	79	80

Client Sample ID			0089_QC211_210316	0089_QC212_210316	0089_QC213_210316	0089_QC214_210316 (A)
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M21-Ma34221**	**M21-Ma34222**	**M21-Ma34223**	**M21-Ma34224**
Date Sampled			**Mar 16, 2021**	**Mar 16, 2021**	**Mar 16, 2021**	**Mar 16, 2021**
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	0.02	41	< 0.01	9.6
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.02	22.6	< 0.01	5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.02	43.6	< 0.01	10.1
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	46.88	< 0.05	11.36
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	50.28	< 0.1	12.03

Client Sample ID			0089_QC214_210316 (B)	0089_QC216_210316
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**M21-Ma34225**	**M21-Ma34226**
Date Sampled			**Mar 16, 2021**	**Mar 16, 2021**
Test/Reference	LOR	Unit		
Ammonia (as N)	0.01	mg/L	< 0.01	< 0.01
Chloride	1	mg/L	I/S	3100
Nitrate (as N)	0.02	mg/L	0.27	4.9
pH (at 25 °C)	0.1	pH Units	8.0	8.3
Sulphate (as SO4)	5	mg/L	I/S	700
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	14000	6700
Total Organic Carbon	5	mg/L	15	22
Total Suspended Solids Dried at 103–105°C	1	mg/L	140	100
Alkalinity (speciated)				
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	290	460
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10
Alkali Metals				
Calcium	0.5	mg/L	350	180
Magnesium	0.5	mg/L	590	250
Potassium	0.5	mg/L	150	68
Sodium	0.5	mg/L	4300	1700
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	0.07	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	0.18	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	0.13	0.04
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	0.10	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	104	95
13C5-PFPeA (surr.)	1	%	80	75
13C5-PFHxA (surr.)	1	%	91	86
13C4-PFHpA (surr.)	1	%	87	92
13C8-PFOA (surr.)	1	%	78	75
13C5-PFNA (surr.)	1	%	91	97
13C6-PFDA (surr.)	1	%	86	85

Client Sample ID			0089_QC214_210316 (B)	0089_QC216_210316
Sample Matrix			Water	Water
Eurofins Sample No.			M21-Ma34225	M21-Ma34226
Date Sampled			Mar 16, 2021	Mar 16, 2021
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs)				
13C2-PFUnDA (surr.)	1	%	77	82
13C2-PFDoDA (surr.)	1	%	83	91
13C2-PFTeDA (surr.)	1	%	110	142
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	101	102
D3-N-MeFOSA (surr.)	1	%	106	110
D5-N-EtFOSA (surr.)	1	%	93	99
D7-N-MeFOSE (surr.)	1	%	132	130
D9-N-EtFOSE (surr.)	1	%	114	112
D5-N-EtFOSAA (surr.)	1	%	34	51
D3-N-MeFOSAA (surr.)	1	%	35	49
Perfluoroalkyl sulfonic acids (PFSAs)				
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	0.03
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	[N09]0.05
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	[N09]0.31
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	87	91
18O2-PFHxS (surr.)	1	%	91	84
13C8-PFOS (surr.)	1	%	108	96
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	0.16	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	81	74
13C2-6:2 FTSA (surr.)	1	%	53	58
13C2-8:2 FTSA (surr.)	1	%	76	80
13C2-10:2 FTSA (surr.)	1	%	82	90

Client Sample ID			0089_QC214_210316 (B)	0089_QC216_210316
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**M21-Ma34225**	**M21-Ma34226**
Date Sampled			**Mar 16, 2021**	**Mar 16, 2021**
Test/Reference	LOR	Unit		
PFASs Summations				
Sum (PFHxS + PFOS)*	0.01	ug/L	0.01	0.31
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.01	0.31
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	0.65	0.38
Sum of PFASs (n=30)*	0.1	ug/L	0.65	0.44

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B11			
Ammonia (as N)	Melbourne	Mar 18, 2021	28 Days
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Chloride	Melbourne	Mar 18, 2021	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Nitrate (as N)	Melbourne	Mar 18, 2021	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Sulphate (as SO4)	Melbourne	Mar 18, 2021	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Alkalinity (speciated)	Melbourne	Mar 18, 2021	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			
Alkali Metals	Melbourne	Mar 18, 2021	180 Days
- Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES			
pH (at 25 °C)	Melbourne	Mar 18, 2021	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Total Organic Carbon	Melbourne	Mar 18, 2021	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			
Total Suspended Solids Dried at 103–105°C	Melbourne	Mar 18, 2021	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Total Dissolved Solids Dried at 180°C ± 2°C	Melbourne	Mar 18, 2021	7 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Mar 22, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Mar 22, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Mar 22, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Mar 22, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING PFAS OMP
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 781350
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Mar 17, 2021 8:39 PM
Due: Mar 25, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794													X	
Perth Laboratory - NATA Site # 23736														
Mayfield Laboratory														
External Laboratory														
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**									
1	0089_QC201_210315	Mar 15, 2021		Soil	M21-Ma34211	X		X			X	X	X	
2	0089_QC202_210315	Mar 15, 2021		Water	M21-Ma34212		X	X	X	X			X	X
3	0089_QC203_210315	Mar 15, 2021		Water	M21-Ma34213		X	X	X	X			X	X
4	0089_QC204_210315	Mar 15, 2021		Water	M21-Ma34214		X	X	X	X			X	X
5	0089_QC205_210315	Mar 15, 2021		Soil	M21-Ma34215	X		X			X	X	X	
6	0089_QC206_	Mar 15, 2021		Water	M21-Ma34216		X	X	X	X			X	X

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Project Name: HMAS STIRLING PFAS OMP
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 781350
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Mar 17, 2021 8:39 PM
Due: Mar 25, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794													X	
Perth Laboratory - NATA Site # 23736														
Mayfield Laboratory														
External Laboratory														
	210315													
7	0089_QC207_210315	Mar 15, 2021		Water	M21-Ma34217		X	X	X	X			X	X
8	0089_QC208_210316	Mar 16, 2021		Water	M21-Ma34218		X	X	X	X			X	X
9	0089_QC209_210316	Mar 16, 2021		Water	M21-Ma34219		X	X	X	X			X	X
10	0089_QC210_210316	Mar 16, 2021		Water	M21-Ma34220		X	X	X	X			X	X
11	0089_QC211_210316	Mar 16, 2021		Water	M21-Ma34221		X	X	X	X			X	X
12	0089_QC212_210316	Mar 16, 2021		Water	M21-Ma34222		X	X	X	X			X	X

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Company Name: Cardno (WA)
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Project Name: HMAS STIRLING PFAS OMP
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 781350
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Mar 17, 2021 8:39 PM
Due: Mar 25, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X		X
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794													X	
Perth Laboratory - NATA Site # 23736														
Mayfield Laboratory														
External Laboratory														
13	0089_QC213_210316	Mar 16, 2021		Water	M21-Ma34223		X	X	X	X			X	X
14	0089_QC214_210316 (A)	Mar 16, 2021		Water	M21-Ma34224		X	X	X	X			X	X
15	0089_QC214_210316 (B)	Mar 16, 2021		Water	M21-Ma34225		X	X	X	X			X	X
16	0089_QC216_210316	Mar 16, 2021		Water	M21-Ma34226		X	X	X	X			X	X
Test Counts						2	14	16	14	14	2	2	16	14

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chloride	mg/L	< 1			1	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10			10	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Total Suspended Solids Dried at 103–105°C	mg/L	< 1			1	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Ammonia (as N)	%	114			70-130	Pass	
Chloride	%	122			70-130	Pass	
Nitrate (as N)	%	126			70-130	Pass	
Sulphate (as SO4)	%	113			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	103			70-130	Pass	
Total Organic Carbon	%	98			70-130	Pass	
Total Suspended Solids Dried at 103–105°C	%	99			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	94			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	100			80-120	Pass	
Magnesium	%	93			80-120	Pass	
Potassium	%	90			80-120	Pass	
Sodium	%	90			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	117			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	92			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	94			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	84			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	94			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	99			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	81			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	89			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	132			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	113			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	121			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	95			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	90			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	84			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	89			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	86			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	80			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	83			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	76			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	80			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	86			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	83			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	90			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	75			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	81			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	81			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	83			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	66			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	106			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	78			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M21-Ma40150	NCP	%	98			70-130	Pass	
Nitrate (as N)	M21-Ma40151	NCP	%	107			70-130	Pass	
Total Suspended Solids Dried at 103–105°C	M21-Ma37928	NCP	%	97			70-130	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Carbonate Alkalinity (as CaCO3)	S21-Ma32985	NCP	%	100			70-130	Pass	
Spike - % Recovery									
				Result 1					
Total Organic Carbon	M21-Ma28066	NCP	%	126			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M21-Ma34213	CP	%	93			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Ma34213	CP	%	96			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Ma34213	CP	%	96			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Ma34213	CP	%	91			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M21-Ma34213	CP	%	103			50-150	Pass	
Perfluorononanoic acid (PFNA)	M21-Ma34213	CP	%	125			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M21-Ma34213	CP	%	100			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M21-Ma34213	CP	%	116			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M21-Ma34213	CP	%	129			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M21-Ma34213	CP	%	147			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Ma34213	CP	%	147			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M21-Ma34213	CP	%	110			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Ma34213	CP	%	105			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Ma34213	CP	%	113			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Ma34213	CP	%	110			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Ma34213	CP	%	109			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Ma34213	CP	%	103			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Ma34213	CP	%	96			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M21-Ma34213	CP	%	86			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorononanesulfonic acid (PFNS)	M21-Ma34213	CP	%	79			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Ma34213	CP	%	91			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Ma34213	CP	%	100			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Ma34213	CP	%	90			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Ma34213	CP	%	80			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Ma34213	CP	%	94			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Ma34213	CP	%	86			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M21-Ma34213	CP	%	98			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M21-Ma34213	CP	%	83			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M21-Ma34213	CP	%	120			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M21-Ma34213	CP	%	98			50-150	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Bicarbonate Alkalinity (as CaCO3)	M21-Ma30309	NCP	%	76			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M21-Ma34220	CP	%	99			75-125	Pass	
Magnesium	M21-Ma34220	CP	%	98			75-125	Pass	
Potassium	M21-Ma34220	CP	%	95			75-125	Pass	
Sodium	M21-Ma34220	CP	%	98			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M21-Ma40150	NCP	mg/L	0.06	0.07	5.0	30%	Pass	
Chloride	M21-Ma28041	NCP	mg/L	380	370	<1	30%	Pass	
Nitrate (as N)	M21-Ma40150	NCP	mg/L	4.5	4.5	<1	30%	Pass	
pH (at 25 °C)	S21-Ma32984	NCP	pH Units	7.5	7.6	pass	30%	Pass	
Sulphate (as SO4)	M21-Ma28041	NCP	mg/L	34	34	1.0	30%	Pass	
Total Suspended Solids Dried at 103–105°C	M21-Ma31752	NCP	mg/L	15	14	6.0	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	S21-Ma32984	NCP	mg/L	89	88	1.0	30%	Pass	
Carbonate Alkalinity (as CaCO3)	S21-Ma32984	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M21-Ma34212	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorodecanoic acid (PFDA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M21-Ma34212	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Ma34212	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Ma34212	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Ma34212	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Ma34212	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Ma34212	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Ma34212	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Ma34212	CP	ug/L	0.02	0.03	9.0	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M21-Ma34212	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M21-Ma34212	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Organic Carbon	M21-Ma28065	NCP	mg/L	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M21-Ma34214	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Ma34214	CP	ug/L	0.01	0.01	1.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M21-Ma34214	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Ma34214	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Ma34214	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Ma34214	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Ma34214	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Ma34214	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Ma34214	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Ma34214	CP	ug/L	0.11	0.11	4.0	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Ma34214	CP	ug/L	0.10	0.09	10	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M21-Ma34214	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M21-Ma34214	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
Total Dissolved Solids Dried at 180°C ± 2°C	M21-Ma34217	CP	mg/L	56000	60000	6.6	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M21-Ma34220	CP	mg/L	530	530	<1	30%	Pass	
Magnesium	M21-Ma34220	CP	mg/L	1400	1400	3.0	30%	Pass	
Potassium	M21-Ma34220	CP	mg/L	420	430	1.0	30%	Pass	
Sodium	M21-Ma34220	CP	mg/L	11000	11000	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Dissolved Solids Dried at 180°C ± 2°C	M21-Ma34225	CP	mg/L	14000	14000	3.8	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
R10	Sample results are unavailable due to instrument failure; there was not enough sample left to continue the tests required

Authorised by:

[redacted] Analytical Services Manager
[redacted] Senior Analyst-Metal (VIC)
[redacted] Senior Analyst-PFAS (QLD)
[redacted] Senior Analyst-Inorganic (VIC)

[redacted]

[redacted]
General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

[redacted] Analytical Services Manager
[redacted] Senior Analyst-Metal (VIC)
[redacted] Senior Analyst-PFAS (QLD)
[redacted] Senior Analyst-Inorganic (VIC)

[redacted]

[redacted]

General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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eurofins | mgt

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Phone: +613 8564 5000 Fax: +613 8564 5090
Email: enquiries.melb@mgtlabmark.com.au

CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Company Name : Cardno (WA) Pty Ltd	**Contact Name :** [redacted]	**Purchase Order :** DEF19009/730	**COC Number :** -01
Office Address : 11 Harvest Terrace, West perth, WA, 6005		**PROJECT Number :** WA_0089_PFASOMP	**Eurofins | mgt quote ID :** NA
	Email for COC/SRN/Results : [redacted]	**PROJECT Name :** HMAS Stirling PFAS OMP	**Data output format:** PDF; ESDAT

Special Directions & Comments :
Please send Esdat reports to [redacted] with the project ID in the header file
Please send invoice to [redacted]

Eurofins | mgt DI water batch number:

	Sample ID	Date	Matrix	PFAS full suite soil	PFAS full suite Water	TOC, TSS, TDS, pH	TOC, CEC, pH	Anions, Cations
1	0089_QC217_210317	17/03/2021	Soil	x			x	
2								
3								
4								
5								
6								
7								
8								
9								
10								

Some common holding times (with correct preservation). For further information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous iron	7 days	ASLP, TCLP	7 days

Containers:

1LP	250P	125P	20P	40mL vial	125mL A	Jar	
						2	

Sample comments:

Laboratory Staff
Received By: [redacted]
Date & Time: 19/3/21 10:49
Signature: [redacted]

Turn around time
1 DAY ☐ 2 DAY ☐ 3 DAY ☐
STANDARD ☑ Other:

Method Of Shipment
☑ Courier
☐ Hand Delivered
☐ Postal
Courier Consignment # :

Temperature on arrival: 26.3°C

Report number:

Relinquished By:
Date & Time :
Signature:

QS3009_R0 Issue Date: 25 February 2013 Page 1 of 1

Date/Time: 19/3/21 10:49
Chilled: Yes/No
Temp: 22.1 25.2 26.3
Correction: +0°C
Final Temp: 26.3°C

782086
Nil

eurofins | Environment Testing

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Phone : +64 9 526 45 51
IANZ # 1327

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43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	Cardno (WA)
Contact name:	[redacted]
Project name:	HMAS STIRLING PFAS OMP
Project ID:	WA_0089_PFASOMP
Turnaround time:	5 Day
Date/Time received	Mar 19, 2021 10:49 AM
Eurofins reference	782088

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

[redacted] **on phone : (+61) 8 9251 9602 or by email:** [redacted]

Results will be delivered electronically via email to [redacted] - [redacted]

Note: A copy of these results will also be delivered to the general Cardno (WA) email address.

Global Leader - Results you can trust

Cardno Consulting WA
11 Harvest Terrace
West Perth
WA 6005

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Attention: [redacted]

Report **782088-S**
Project name HMAS STIRLING PFAS OMP
Project ID WA_0089_PFASOMP
Received Date Mar 19, 2021

Client Sample ID			**0089_QC217_210317**
Sample Matrix			**Soil**
Eurofins Sample No.			**M21-Ma40438**
Date Sampled			**Mar 17, 2021**
Test/Reference	LOR	Unit	
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	1700
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	9.3
Total Organic Carbon	0.1	%	< 0.1
% Moisture	1	%	11
Cation Exchange Capacity			
Cation Exchange Capacity	0.05	meq/100g	29
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	73
13C5-PFPeA (surr.)	1	%	63
13C5-PFHxA (surr.)	1	%	59
13C4-PFHpA (surr.)	1	%	72
13C8-PFOA (surr.)	1	%	64
13C5-PFNA (surr.)	1	%	135
13C6-PFDA (surr.)	1	%	100
13C2-PFUnDA (surr.)	1	%	92
13C2-PFDoDA (surr.)	1	%	86
13C2-PFTeDA (surr.)	1	%	82
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	5	ug/kg	< 5

Client Sample ID			0089_QC217_210317
Sample Matrix			**Soil**
Eurofins Sample No.			**M21-Ma40438**
Date Sampled			**Mar 17, 2021**
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	5	ug/kg	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10
13C8-FOSA (surr.)	1	%	120
D3-N-MeFOSA (surr.)	1	%	92
D5-N-EtFOSA (surr.)	1	%	148
D7-N-MeFOSE (surr.)	1	%	102
D9-N-EtFOSE (surr.)	1	%	120
D5-N-EtFOSAA (surr.)	1	%	85
D3-N-MeFOSAA (surr.)	1	%	94
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	112
18O2-PFHxS (surr.)	1	%	126
13C8-PFOS (surr.)	1	%	138
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5
13C2-4:2 FTS (surr.)	1	%	64
13C2-6:2 FTSA (surr.)	1	%	32
13C2-8:2 FTSA (surr.)	1	%	101
13C2-10:2 FTSA (surr.)	1	%	98
PFASs Summations			
Sum (PFHxS + PFOS)*	5	ug/kg	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Conductivity (1:5 aqueous extract at 25°C as rec.)	Melbourne	Mar 24, 2021	7 Days
- Method: LTM-INO-4030 Conductivity			
Cation Exchange Capacity	Melbourne	Mar 25, 2021	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage			
pH (1:5 Aqueous extract at 25°C as rec.)	Melbourne	Mar 24, 2021	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Total Organic Carbon	Melbourne	Mar 25, 2021	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			
% Moisture	Melbourne	Mar 22, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Mar 25, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Mar 25, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Mar 25, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Mar 25, 2021	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

eurofins | Environment Testing

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IANZ # 1290

Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING PFAS OMP
Project ID: WA_0089_PFASOMP

Order No.:
Report #: 782088
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Mar 19, 2021 10:49 AM
Due: Mar 26, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	Total Organic Carbon	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794										X
Perth Laboratory - NATA Site # 23736										
Mayfield Laboratory										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	0089_QC217_210317	Mar 17, 2021		Soil	M21-Ma40438	X	X	X	X	X
Test Counts						1	1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Organic Carbon	%	< 0.1			0.1	Pass	
Method Blank							
Cation Exchange Capacity							
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Total Organic Carbon	%	98			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	95			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	97			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	104			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	92			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctanoic acid (PFOA)	%	106			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	101			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	91			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	107			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	108			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	108			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	100			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	105			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	100			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	106			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	99			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	94			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	104			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	105			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	99			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	106			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	109			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	92			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	86			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	106			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	87			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	94			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	88			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	125			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	78			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	B21-Ma43892	NCP	%	102			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B21-Ma43892	NCP	%	103			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B21-Ma43892	NCP	%	108			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B21-Ma43892	NCP	%	101			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B21-Ma43892	NCP	%	109			50-150	Pass	
Perfluorononanoic acid (PFNA)	B21-Ma43892	NCP	%	112			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B21-Ma43892	NCP	%	103			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	B21-Ma43892	NCP	%	113			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	B21-Ma43892	NCP	%	108			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B21-Ma43892	NCP	%	121			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B21-Ma43892	NCP	%	116			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	B21-Ma43892	NCP	%	101			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B21-Ma43892	NCP	%	111			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B21-Ma43892	NCP	%	102			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B21-Ma43892	NCP	%	94			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B21-Ma43892	NCP	%	95			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B21-Ma43892	NCP	%	91			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B21-Ma43892	NCP	%	108			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	B21-Ma43892	NCP	%	110			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	B21-Ma43892	NCP	%	103			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B21-Ma43892	NCP	%	126			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B21-Ma43892	NCP	%	115			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B21-Ma43892	NCP	%	102			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B21-Ma43892	NCP	%	109			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B21-Ma43892	NCP	%	90			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B21-Ma43892	NCP	%	108			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B21-Ma43892	NCP	%	89			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B21-Ma43892	NCP	%	109			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B21-Ma43892	NCP	%	107			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B21-Ma43892	NCP	%	84			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C as rec.)	M21-Ma41407	NCP	uS/cm	510	510	<1	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	M21-Ma41403	NCP	pH Units	9.0	8.8	pass	30%	Pass	
Total Organic Carbon	M21-Ma40438	CP	%	< 0.1	< 0.1	<1	30%	Pass	
% Moisture	M21-Ma41365	NCP	%	14	15	11	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorononanoic acid (PFNA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B21-Ma43891	NCP	ug/kg	< 10	< 10	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B21-Ma43891	NCP	ug/kg	< 10	< 10	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B21-Ma43891	NCP	ug/kg	< 10	< 10	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B21-Ma43891	NCP	ug/kg	< 5	< 5	<1	30%	Pass

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

[redacted] Analytical Services Manager
[redacted] Senior Analyst-Metal (VIC)
[redacted] Senior Analyst-PFAS (QLD)
[redacted] Senior Analyst-Inorganic (VIC)

[redacted]

General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

eurofins | Environment Testing

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING PFAS OMP
Project ID: WA_0089_PFASOMP

Order No.:
Report #: 782088
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Mar 19, 2021 10:49 AM
Due: Mar 26, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	Total Organic Carbon	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794										X
Perth Laboratory - NATA Site # 23736										
Mayfield Laboratory										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	0089_QC217_210317	Mar 17, 2021		Soil	M21-Ma40438	X	X	X	X	X
Test Counts						1	1	1	1	1

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102752**	Page	: 1 of 15
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021 16:20
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20247	Issue Date	: 23-Mar-2021 21:48
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 16		
No. of samples analysed	: 16		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW124_210315	0089_PW335_210315	0089_MW127_210315	0089_PW363_210315	0089_MW126_210315
			Sampling date / time	15-Mar-2021 09:01	15-Mar-2021 09:19	15-Mar-2021 09:47	15-Mar-2021 10:00	15-Mar-2021 10:27
Compound	CAS Number	LOR	Unit	EP2102752-001	EP2102752-002	EP2102752-003	EP2102752-004	EP2102752-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.54	7.52	7.41	7.62	7.42
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	33200	42500	31000	43400	33000
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	36	1680	188	234	684
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	324	145	438	122	400
Total Alkalinity as CaCO3	----	1	mg/L	324	145	438	122	400
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2160	2860	1920	2940	2040
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	15800	21200	14600	21200	15900
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	482	508	432	512	506
Magnesium	7439-95-4	1	mg/L	1210	1600	1230	1630	1280
Sodium	7440-23-5	1	mg/L	9100	12700	8600	13100	9160
Potassium	7440-09-7	1	mg/L	459	674	431	690	453
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	497	660	460	662	499
ø Total Cations	----	0.01	meq/L	531	727	508	747	541
ø Ionic Balance	----	0.01	%	3.31	4.77	4.88	6.07	4.00
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	12	6	22	3	12
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW124_210315	0089_PW335_210315	0089_MW127_210315	0089_PW363_210315	0089_MW126_210315
				Sampling date / time	15-Mar-2021 09:01	15-Mar-2021 09:19	15-Mar-2021 09:47	15-Mar-2021 10:00	15-Mar-2021 10:27
Compound	CAS Number	LOR	Unit		EP2102752-001	EP2102752-002	EP2102752-003	EP2102752-004	EP2102752-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.07**	<0.01	**0.04**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW124_210315	0089_PW335_210315	0089_MW127_210315	0089_PW363_210315	0089_MW126_210315
				Sampling date / time	15-Mar-2021 09:01	15-Mar-2021 09:19	15-Mar-2021 09:47	15-Mar-2021 10:00	15-Mar-2021 10:27
Compound	CAS Number	LOR	Unit		EP2102752-001	EP2102752-002	EP2102752-003	EP2102752-004	EP2102752-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.07**	<0.01	**0.04**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.07**	<0.01	**0.04**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.07**	<0.01	**0.04**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**75.8**	**81.9**	**77.2**	**75.6**	**76.4**
13C8-PFOA	----	0.02	%		**117**	**110**	**106**	**110**	**116**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW341_210315	0089_MW125_210315	0089_MW161_210315	0089_MW171_210315	0089_MW228_210315
				Sampling date / time	15-Mar-2021 10:27	15-Mar-2021 10:53	15-Mar-2021 11:31	15-Mar-2021 12:05	15-Mar-2021 14:21
Compound	CAS Number	LOR	Unit		EP2102752-006	EP2102752-007	EP2102752-008	EP2102752-009	EP2102752-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.66	7.48	7.84	7.72	7.56
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		44000	35000	1990	6280	21400
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		253	145	642	29	313
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		116	448	337	358	491
Total Alkalinity as CaCO3	----	1	mg/L		116	448	337	358	491
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2960	2290	188	349	1490
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		21200	16900	779	3000	10000
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		513	542	78	147	299
Magnesium	7439-95-4	1	mg/L		1640	1350	81	237	777
Sodium	7440-23-5	1	mg/L		13000	9990	437	1590	5630
Potassium	7440-09-7	1	mg/L		689	508	38	81	296
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		662	533	32.6	99.0	323
ø Total Cations	----	0.01	meq/L		744	586	30.5	98.1	331
ø Ionic Balance	----	0.01	%		5.81	4.68	3.30	0.49	1.28
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		9	12	5	11	40
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.14	0.05	0.07	0.10
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.12	0.05	0.03	0.04
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	0.43	0.81	0.15	0.03
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	0.11	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW341_210315	0089_MW125_210315	0089_MW161_210315	0089_MW171_210315	0089_MW228_210315
				Sampling date / time	15-Mar-2021 10:27	15-Mar-2021 10:53	15-Mar-2021 11:31	15-Mar-2021 12:05	15-Mar-2021 14:21
Compound	CAS Number	LOR	Unit		EP2102752-006	EP2102752-007	EP2102752-008	EP2102752-009	EP2102752-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.04**	<0.01	**7.16**	**0.03**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	**2.0**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.02**	**0.21**	**0.04**	**9.40**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.11**	**0.17**	**0.08**	**8.86**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**0.06**	<0.02	**1.16**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.08**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	**0.02**	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW341_210315	0089_MW125_210315	0089_MW161_210315	0089_MW171_210315	0089_MW228_210315
				Sampling date / time	15-Mar-2021 10:27	15-Mar-2021 10:53	15-Mar-2021 11:31	15-Mar-2021 12:05	15-Mar-2021 14:21
Compound	CAS Number	LOR	Unit		EP2102752-006	EP2102752-007	EP2102752-008	EP2102752-009	EP2102752-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.04**	**0.82**	**8.72**	**0.40**	**21.6**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.04**	**0.43**	**7.97**	**0.18**	**0.03**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.04**	**0.70**	**8.54**	**0.37**	**21.6**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**76.3**	**72.1**	**75.3**	**76.3**	**82.6**
13C8-PFOA	----	0.02	%		**114**	**109**	**104**	**119**	**110**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW127_210315	0089_MW227_210315	0089_PW407_210315	0089_PW405_210315	0089_MW158_210315
				Sampling date / time	15-Mar-2021 14:26	15-Mar-2021 14:28	15-Mar-2021 14:29	15-Mar-2021 14:30	15-Mar-2021 14:32
Compound	CAS Number	LOR	Unit		EP2102752-011	EP2102752-012	EP2102752-013	EP2102752-014	EP2102752-015
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.75	7.65	7.81	7.71	7.76
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		2550	3270	44500	42700	9480
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		38	57	16500	1060	6
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		388	528	110	105	405
Total Alkalinity as CaCO3	----	1	mg/L		388	528	110	105	405
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		164	373	2890	2950	524
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		943	1240	20800	21200	4390
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		140	188	488	486	202
Magnesium	7439-95-4	1	mg/L		109	126	1570	1560	343
Sodium	7440-23-5	1	mg/L		568	747	12500	12400	2400
Potassium	7440-09-7	1	mg/L		50	22	659	660	112
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		37.8	53.3	649	662	143
ø Total Cations	----	0.01	meq/L		41.9	52.8	714	709	146
ø Ionic Balance	----	0.01	%		5.24	0.46	4.77	3.45	0.95
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		4	29	2	4	12
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.03	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.03	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.74	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		0.15	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW127_210315	0089_MW227_210315	0089_PW407_210315	0089_PW405_210315	0089_MW158_210315
				Sampling date / time	15-Mar-2021 14:26	15-Mar-2021 14:28	15-Mar-2021 14:29	15-Mar-2021 14:30	15-Mar-2021 14:32
Compound	CAS Number	LOR	Unit		EP2102752-011	EP2102752-012	EP2102752-013	EP2102752-014	EP2102752-015
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**8.40**	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.26**	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.24**	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.12**	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.08**	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.02**	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW127_210315	0089_MW227_210315	0089_PW407_210315	0089_PW405_210315	0089_MW158_210315
				Sampling date / time	15-Mar-2021 14:26	15-Mar-2021 14:28	15-Mar-2021 14:29	15-Mar-2021 14:30	15-Mar-2021 14:32
Compound	CAS Number	LOR	Unit		EP2102752-011	EP2102752-012	EP2102752-013	EP2102752-014	EP2102752-015
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**10.1**	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**9.14**	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**9.87**	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**66.6**	**80.8**	**81.9**	**83.6**	**73.0**
13C8-PFOA	----	0.02	%		**113**	**114**	**106**	**107**	**118**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW340_210315	----	----	----	----
				Sampling date / time	15-Mar-2021 14:34	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102752-016	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.62	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		46200	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		541	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		133	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		133	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2980	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		22000	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		556	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1780	----	----	----	----
Sodium	7440-23-5	1	mg/L		14200	----	----	----	----
Potassium	7440-09-7	1	mg/L		754	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		685	----	----	----	----
ø Total Cations	----	0.01	meq/L		811	----	----	----	----
ø Ionic Balance	----	0.01	%		8.41	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		6	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW340_210315	----	----	----	----
				Sampling date / time	15-Mar-2021 14:34	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102752-016	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.28**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW340_210315	----	----	----	----
				Sampling date / time	15-Mar-2021 14:34	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102752-016	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.28**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.28**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.28**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**67.4**	----	----	----	----
13C8-PFOA	----	0.02	%		**110**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102752**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20247	Issue Date	: 23-Mar-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 16		
No. of samples analysed	: 16		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3571637)									
EP2102752-003	0089_MW127_210315	EA005-P: pH Value	----	0.01	pH Unit	7.41	7.40	0.135	0% - 20%
EP2102752-012	0089_MW227_210315	EA005-P: pH Value	----	0.01	pH Unit	7.65	7.64	0.131	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3577269)									
EP2102752-001	0089_MW124_210315	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	33200	32800	1.12	0% - 20%
EP2102752-009	0089_MW171_210315	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	6280	6340	0.982	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3577270)									
EP2102752-001	0089_MW124_210315	EA025H: Suspended Solids (SS)	----	5	mg/L	36	32	10.4	No Limit
EP2102752-011	0089_MW127_210315	EA025H: Suspended Solids (SS)	----	5	mg/L	38	36	6.10	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3571636)									
EP2102752-003	0089_MW127_210315	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	438	437	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	438	437	0.00	0% - 20%
EP2102752-012	0089_MW227_210315	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	528	595	11.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	528	595	11.8	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3570302)									
EP2102752-001	0089_MW124_210315	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2160	2180	1.20	0% - 20%
EP2102752-011	0089_MW127_210315	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	164	170	3.26	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3572765)									
EP2102752-016	0089_PW340_210315	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2980	3010	1.05	0% - 20%
EP2102951-021	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	713	748	4.75	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3570303)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 3570303) - continued									
EP2102752-001	0089_MW124_210315	ED045G: Chloride	16887-00-6	1	mg/L	15800	16000	1.68	0% - 20%
EP2102752-011	0089_MW127_210315	ED045G: Chloride	16887-00-6	1	mg/L	943	947	0.401	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3572766)									
EP2102752-016	0089_PW340_210315	ED045G: Chloride	16887-00-6	1	mg/L	22000	22300	1.42	0% - 20%
EP2102951-021	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2480	2540	2.47	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3568775)									
EP2102752-001	0089_MW124_210315	ED093F: Calcium	7440-70-2	1	mg/L	482	486	0.684	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1210	1220	0.562	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9100	9140	0.349	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	459	463	0.868	0% - 20%
EP2102752-011	0089_MW127_210315	ED093F: Calcium	7440-70-2	1	mg/L	140	143	1.91	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	109	110	0.976	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	568	564	0.809	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	50	50	0.00	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3572495)									
EP2102752-001	0089_MW124_210315	EP005: Total Organic Carbon	----	1	mg/L	12	10	10.5	0% - 50%
EP2102752-011	0089_MW127_210315	EP005: Total Organic Carbon	----	1	mg/L	4	6	38.6	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3571637)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3577269)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.9	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3577270)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	92.3	89.1	120
				<5	1000 mg/L	97.6	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3571636)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	88.5	81.2	126
				<1	200 mg/L	93.0	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3570302)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	87.7	113
				<1	500 mg/L	106	87.7	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572765)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	87.7	113
				<1	500 mg/L	105	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3570303)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	104	87.9	114
				<1	1000 mg/L	104	87.9	114
ED045G: Chloride by Discrete Analyser (QCLot: 3572766)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	106	87.9	114
				<1	1000 mg/L	97.0	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3568775)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	94.7	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.5	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.0	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3572495)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 3572495) - continued								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	109	87.2	116
				<1	100 mg/L	108	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3569582)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	87.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	91.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	85.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	86.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	82.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	86.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3569582)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	85.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	88.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	89.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	82.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	91.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	113	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	116	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	124	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	114	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	85.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3569582)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	111	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	95.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	100	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	95.1	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	127	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	105	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3569582)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	85.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	95.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	108	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	111	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3570302)							
EP2102752-001	0089_MW124_210315	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572765)							
EP2102752-016	0089_PW340_210315	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3570303)							
EP2102752-001	0089_MW124_210315	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3572766)							
EP2102752-016	0089_PW340_210315	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3572495)							
EP2102752-002	0089_PW335_210315	EP005: Total Organic Carbon	----	100 mg/L	105	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102752**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 23-Mar-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 16
Order number	: DEF19009/730	No. of samples analysed	: 16

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102752--001	0089_MW124_210315	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102752--016	0089_PW340_210315	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102752--001	0089_MW124_210315	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102752--016	0089_PW340_210315	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW124_210315,	0089_PW335_210315,	----	----	----	18-Mar-2021	15-Mar-2021	**3**
0089_MW127_210315,	0089_PW363_210315,						
0089_MW126_210315,	0089_PW341_210315,						
0089_MW125_210315,	0089_MW161_210315,						
0089_MW171_210315,	0089_MW228_210315,						
0089_MW127_210315,	0089_MW227_210315,						
0089_PW407_210315,	0089_PW405_210315,						
0089_MW158_210315,	0089_PW340_210315						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_MW124_210315,	0089_PW335_210315,	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	15-Mar-2021	×
0089_MW127_210315,	0089_PW363_210315,							
0089_MW126_210315,	0089_PW341_210315,							
0089_MW125_210315,	0089_MW161_210315,							
0089_MW171_210315,	0089_MW228_210315,							
0089_MW127_210315,	0089_MW227_210315,							
0089_PW407_210315,	0089_PW405_210315,							
0089_MW158_210315,	0089_PW340_210315							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_MW124_210315,	0089_PW335_210315,	**15-Mar-2021**	**----**	----	----	**22-Mar-2021**	22-Mar-2021	✓
0089_MW127_210315,	0089_PW363_210315,							
0089_MW126_210315,	0089_PW341_210315,							
0089_MW125_210315,	0089_MW161_210315,							
0089_MW171_210315,	0089_MW228_210315,							
0089_MW127_210315,	0089_MW227_210315,							
0089_PW407_210315,	0089_PW405_210315,							
0089_MW158_210315,	0089_PW340_210315							
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
0089_MW124_210315,	0089_PW335_210315,	**15-Mar-2021**	**----**	----	----	**22-Mar-2021**	22-Mar-2021	✓
0089_MW127_210315,	0089_PW363_210315,							
0089_MW126_210315,	0089_PW341_210315,							
0089_MW125_210315,	0089_MW161_210315,							
0089_MW171_210315,	0089_MW228_210315,							
0089_MW127_210315,	0089_MW227_210315,							
0089_PW407_210315,	0089_PW405_210315,							
0089_MW158_210315,	0089_PW340_210315							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW124_210315, 0089_PW335_210315, 0089_MW127_210315, 0089_PW363_210315, 0089_MW126_210315, 0089_PW341_210315, 0089_MW125_210315, 0089_MW161_210315, 0089_MW171_210315, 0089_MW228_210315, 0089_MW127_210315, 0089_MW227_210315, 0089_PW407_210315, 0089_PW405_210315, 0089_MW158_210315, 0089_PW340_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	29-Mar-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW124_210315, 0089_PW335_210315, 0089_MW127_210315, 0089_PW363_210315, 0089_MW126_210315, 0089_PW341_210315, 0089_MW125_210315, 0089_MW161_210315, 0089_MW171_210315, 0089_MW228_210315, 0089_MW127_210315, 0089_MW227_210315, 0089_PW407_210315, 0089_PW405_210315, 0089_MW158_210315	**15-Mar-2021**	**----**	----	----	**19-Mar-2021**	12-Apr-2021	✓
Clear Plastic Bottle - Natural (ED041G)							
0089_PW340_210315	**15-Mar-2021**	**----**	----	----	**22-Mar-2021**	12-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW124_210315, 0089_PW335_210315, 0089_MW127_210315, 0089_PW363_210315, 0089_MW126_210315, 0089_PW341_210315, 0089_MW125_210315, 0089_MW161_210315, 0089_MW171_210315, 0089_MW228_210315, 0089_MW127_210315, 0089_MW227_210315, 0089_PW407_210315, 0089_PW405_210315, 0089_MW158_210315	**15-Mar-2021**	**----**	----	----	**19-Mar-2021**	12-Apr-2021	✓
Clear Plastic Bottle - Natural (ED045G)							
0089_PW340_210315	**15-Mar-2021**	**----**	----	----	**22-Mar-2021**	12-Apr-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW124_210315, 0089_PW335_210315, 0089_MW127_210315, 0089_PW363_210315, 0089_MW126_210315, 0089_PW341_210315, 0089_MW125_210315, 0089_MW161_210315, 0089_MW171_210315, 0089_MW228_210315, 0089_MW127_210315, 0089_MW227_210315, 0089_PW407_210315, 0089_PW405_210315, 0089_MW158_210315, 0089_PW340_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	22-Mar-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW124_210315, 0089_PW335_210315, 0089_MW127_210315, 0089_PW363_210315, 0089_MW126_210315, 0089_PW341_210315, 0089_MW125_210315, 0089_MW161_210315, 0089_MW171_210315, 0089_MW228_210315, 0089_MW127_210315, 0089_MW227_210315, 0089_PW407_210315, 0089_PW405_210315, 0089_MW158_210315, 0089_PW340_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	12-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW124_210315, 0089_PW335_210315, 0089_MW127_210315, 0089_PW363_210315, 0089_MW126_210315, 0089_PW341_210315, 0089_MW125_210315, 0089_MW161_210315, 0089_MW171_210315, 0089_MW228_210315, 0089_MW127_210315, 0089_MW227_210315, 0089_PW407_210315, 0089_PW405_210315, 0089_MW158_210315, 0089_PW340_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	11-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW124_210315, 0089_PW335_210315, 0089_MW127_210315, 0089_PW363_210315, 0089_MW126_210315, 0089_PW341_210315, 0089_MW125_210315, 0089_MW161_210315, 0089_MW171_210315, 0089_MW228_210315, 0089_MW127_210315, 0089_MW227_210315, 0089_PW407_210315, 0089_PW405_210315, 0089_MW158_210315, 0089_PW340_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	11-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0089_MW124_210315,	0089_PW335_210315,	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	11-Sep-2021	✓
0089_MW127_210315,	0089_PW363_210315,							
0089_MW126_210315,	0089_PW341_210315,							
0089_MW125_210315,	0089_MW161_210315,							
0089_MW171_210315,	0089_MW228_210315,							
0089_MW127_210315,	0089_MW227_210315,							
0089_PW407_210315,	0089_PW405_210315,							
0089_MW158_210315,	0089_PW340_210315							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW124_210315,	0089_PW335_210315,	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	11-Sep-2021	✓
0089_MW127_210315,	0089_PW363_210315,							
0089_MW126_210315,	0089_PW341_210315,							
0089_MW125_210315,	0089_MW161_210315,							
0089_MW171_210315,	0089_MW228_210315,							
0089_MW127_210315,	0089_MW227_210315,							
0089_PW407_210315,	0089_PW405_210315,							
0089_MW158_210315,	0089_PW340_210315							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0089_MW124_210315,	0089_PW335_210315,	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	11-Sep-2021	✓
0089_MW127_210315,	0089_PW363_210315,							
0089_MW126_210315,	0089_PW341_210315,							
0089_MW125_210315,	0089_MW161_210315,							
0089_MW171_210315,	0089_MW228_210315,							
0089_MW127_210315,	0089_MW227_210315,							
0089_PW407_210315,	0089_PW405_210315,							
0089_MW158_210315,	0089_PW340_210315							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102752**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20247	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 15-Mar-2021 16:20	Issue Date	: 16-Mar-2021
Client Requested Due Date	: 24-Mar-2021	Scheduled Reporting Date	: **24-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 16 / 16

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102752-001	15-Mar-2021 09:01	0089_MW124_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-002	15-Mar-2021 09:19	0089_PW335_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-003	15-Mar-2021 09:47	0089_MW127_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-004	15-Mar-2021 10:00	0089_PW363_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-005	15-Mar-2021 10:27	0089_MW126_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-006	15-Mar-2021 10:27	0089_PW341_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-007	15-Mar-2021 10:53	0089_MW125_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-008	15-Mar-2021 11:31	0089_MW161_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-009	15-Mar-2021 12:05	0089_MW171_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-010	15-Mar-2021 14:21	0089_MW228_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-011	15-Mar-2021 14:26	0089_MW127_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-012	15-Mar-2021 14:28	0089_MW227_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-013	15-Mar-2021 14:29	0089_PW407_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-014	15-Mar-2021 14:30	0089_PW405_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-015	15-Mar-2021 14:32	0089_MW158_210315	✓	✓	✓	✓	✓	✓	✓
EP2102752-016	15-Mar-2021 14:34	0089_PW340_210315	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102752-001	15-Mar-2021 09:01	0089_MW124_210315	✓
EP2102752-002	15-Mar-2021 09:19	0089_PW335_210315	✓
EP2102752-003	15-Mar-2021 09:47	0089_MW127_210315	✓
EP2102752-004	15-Mar-2021 10:00	0089_PW363_210315	✓
EP2102752-005	15-Mar-2021 10:27	0089_MW126_210315	✓
EP2102752-006	15-Mar-2021 10:27	0089_PW341_210315	✓
EP2102752-007	15-Mar-2021 10:53	0089_MW125_210315	✓
EP2102752-008	15-Mar-2021 11:31	0089_MW161_210315	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102752-009	15-Mar-2021 12:05	0089_MW171_210315	✓
EP2102752-010	15-Mar-2021 14:21	0089_MW228_210315	✓
EP2102752-011	15-Mar-2021 14:26	0089_MW127_210315	✓
EP2102752-012	15-Mar-2021 14:28	0089_MW227_210315	✓
EP2102752-013	15-Mar-2021 14:29	0089_PW407_210315	✓
EP2102752-014	15-Mar-2021 14:30	0089_PW405_210315	✓
EP2102752-015	15-Mar-2021 14:32	0089_MW158_210315	✓
EP2102752-016	15-Mar-2021 14:34	0089_PW340_210315	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

(ALS) COC#: 20247 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: [redacted] 15/3/21 1620	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS | **ANALYSIS REQUIRED**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW124		15/03/2021 09:01 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW335		15/03/2021 09:19 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW127		15/03/2021 09:47 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_PW363		15/03/2021 10:00 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_MW126		15/03/2021 10:27 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_PW341		15/03/2021 10:27 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_MW125		15/03/2021 10:53 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_MW161		15/03/2021 11:31 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_MW171		15/03/2021 12:05 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division Perth

Work Order Reference

EP2102752

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: **20247** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW228		15/03/2021 02:21 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
011	0089_MW127		15/03/2021 02:26 PM	Water	ALS: 4 Non ALS: 0	No	X	X		
012	0089_MW227		15/03/2021 02:28 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
013	0089_PW407		15/03/2021 02:29 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
014	0089_PW405		15/03/2021 02:30 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
015	0089_MW158		15/03/2021 02:32 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
016	0089_PW340		15/03/2021 02:34 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

ALS COC#: 20247 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW124	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW335	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW127	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_PW363	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW126	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 20247 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW341	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW125	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW161	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_MW171	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_MW228	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
012	0089_MW227	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **20247** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

013	0089_PW407	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
014	0089_PW405	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
015	0089_MW158	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
016	0089_PW340	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 20247 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW124	Clear Plastic Bottle - Natural	250 mL	00070719175430	Green	No	
001	0089_MW124	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001765	Purple	No	
001	0089_MW124	HDPE (no PTFE)	20 mL	00352010071194	Grey	No	
001	0089_MW124	HDPE (no PTFE)	20 mL	00352010071670	Grey	No	
002	0089_PW335	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001531	Purple	No	
002	0089_PW335	Clear Plastic Bottle - Natural	250 mL	00070719175511	Green	No	
002	0089_PW335	HDPE (no PTFE)	20 mL	00352010071652	Grey	No	
002	0089_PW335	HDPE (no PTFE)	20 mL	00352010071461	Grey	No	
003	0089_MW127	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001768	Purple	No	
003	0089_MW127	Clear Plastic Bottle - Natural	250 mL	00070719175452	Green	No	
003	0089_MW127	HDPE (no PTFE)	20 mL	00352010071115	Grey	No	
003	0089_MW127	HDPE (no PTFE)	20 mL	00352010071101	Grey	No	
004	0089_PW363	Clear Plastic Bottle - Natural	250 mL	00070719175438	Green	No	
004	0089_PW363	HDPE (no PTFE)	20 mL	00352010071455	Grey	No	
004	0089_PW363	HDPE (no PTFE)	20 mL	00352010071111	Grey	No	
004	0089_PW363	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001566	Purple	No	
005	0089_MW126	Clear Plastic Bottle - Natural	250 mL	00070719175426	Green	No	
005	0089_MW126	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001789	Purple	No	
005	0089_MW126	HDPE (no PTFE)	20 mL	00352010071236	Grey	No	
005	0089_MW126	HDPE (no PTFE)	20 mL	00352010071269	Grey	No	
006	0089_PW341	Clear Plastic Bottle - Natural	250 mL	00070719175432	Green	No	
006	0089_PW341	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001889	Purple	No	
006	0089_PW341	HDPE (no PTFE)	20 mL	00352010071389	Grey	No	
006	0089_PW341	HDPE (no PTFE)	20 mL	00352010071603	Grey	No	
007	0089_MW125	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001872	Purple	No	
007	0089_MW125	HDPE (no PTFE)	20 mL	00352010071291	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 20247 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_MW125	HDPE (no PTFE)	20 mL	00352010071228	Grey	No	
007	0089_MW125	Clear Plastic Bottle - Natural	250 mL	00070719175453	Green	No	
008	0089_MW161	Clear Plastic Bottle - Natural	250 mL	00070719175481	Green	No	
008	0089_MW161	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001883	Purple	No	
008	0089_MW161	HDPE (no PTFE)	20 mL	00352010071418	Grey	No	
008	0089_MW161	HDPE (no PTFE)	20 mL	00352010071158	Grey	No	
009	0089_MW171	Clear Plastic Bottle - Natural	250 mL	00070719175488	Green	No	
009	0089_MW171	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001549	Purple	No	
009	0089_MW171	HDPE (no PTFE)	20 mL	00352010071339	Grey	No	
009	0089_MW171	HDPE (no PTFE)	20 mL	00352010071671	Grey	No	
010	0089_MW228	Clear Plastic Bottle - Natural	250 mL	00070719175427	Green	No	
010	0089_MW228	HDPE (no PTFE)	20 mL	00352010071225	Grey	No	
010	0089_MW228	HDPE (no PTFE)	20 mL	00352010071121	Grey	No	
010	0089_MW228	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001799	Purple	No	
011	0089_MW127	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001750	Purple	No	
011	0089_MW127	Clear Plastic Bottle - Natural	250 mL	00070719175455	Green	No	
011	0089_MW127	HDPE (no PTFE)	20 mL	00352010071155	Grey	No	
011	0089_MW127	HDPE (no PTFE)	20 mL	00352010071145	Grey	No	
012	0089_MW227	Clear Plastic Bottle - Natural	250 mL	00070719175479	Green	No	
012	0089_MW227	HDPE (no PTFE)	20 mL	00352010071138	Grey	No	
012	0089_MW227	HDPE (no PTFE)	20 mL	00352010071334	Grey	No	
012	0089_MW227	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001854	Purple	No	
013	0089_PW407	Clear Plastic Bottle - Natural	250 mL	00070719175448	Green	No	
013	0089_PW407	HDPE (no PTFE)	20 mL	00352010071307	Grey	No	
013	0089_PW407	HDPE (no PTFE)	20 mL	00352010071233	Grey	No	
013	0089_PW407	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001795	Purple	No	
014	0089_PW405	Clear Plastic Bottle - Natural	250 mL	00070719175440	Green	No	

CHAIN OF CUSTODY

ALS COC#: 20247 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

014	0089_PW405	HDPE (no PTFE)	20 mL	00352010080459	Grey	No	
014	0089_PW405	HDPE (no PTFE)	20 mL	00352010080601	Grey	No	
014	0089_PW405	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001862	Purple	No	
015	0089_MW158	Clear Plastic Bottle - Natural	250 mL	00070719175492	Green	No	
015	0089_MW158	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001882	Purple	No	
015	0089_MW158	HDPE (no PTFE)	20 mL	00352010080613	Grey	No	
015	0089_MW158	HDPE (no PTFE)	20 mL	00352010080607	Grey	No	
016	0089_PW340	Clear Plastic Bottle - Natural	250 mL	00070719175454	Green	No	
016	0089_PW340	HDPE (no PTFE)	20 mL	00352010071860	Grey	No	
016	0089_PW340	HDPE (no PTFE)	20 mL	00352010080652	Grey	No	
016	0089_PW340	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001697	Purple	No	

Total Bottle Count: ALS: 64, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102754**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021 16:20
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Mar-2021
C-O-C number	: 20253	Issue Date	: 23-Mar-2021 21:49
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD335_210315	0089_SD363_210315	0089_SD341_210315	0089_SD407_210315	0089_SD405_210315
				Sampling date / time	15-Mar-2021 09:22	15-Mar-2021 10:01	15-Mar-2021 10:26	15-Mar-2021 14:19	15-Mar-2021 14:20
					EP2102754-001	EP2102754-002	EP2102754-003	EP2102754-004	EP2102754-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**8.6**	**8.7**	**8.7**	**8.8**	**8.8**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**3980**	**3990**	**4170**	**3780**	**3770**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**25.2**	**25.3**	**24.1**	**24.7**	**25.9**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**2.9**	**2.7**	**2.9**	**2.8**	**8.8**
Exchangeable Magnesium	----	0.1	meq/100g		**0.4**	**0.4**	**0.4**	**0.4**	**0.9**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		**0.1**	**0.1**	**0.1**	<0.1	**0.1**
Cation Exchange Capacity	----	0.1	meq/100g		**3.5**	**3.2**	**3.5**	**3.3**	**9.9**
Exchangeable Sodium Percent	----	0.1	%		**3.8**	**3.1**	**3.1**	**2.3**	**1.4**
EP004: Organic Matter									
Organic Matter	----	0.5	%		**0.5**	**0.7**	**0.6**	**0.6**	**0.6**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD335_210315	0089_SD363_210315	0089_SD341_210315	0089_SD407_210315	0089_SD405_210315
				Sampling date / time	15-Mar-2021 09:22	15-Mar-2021 10:01	15-Mar-2021 10:26	15-Mar-2021 14:19	15-Mar-2021 14:20
Compound	CAS Number	LOR	Unit		EP2102754-001	EP2102754-002	EP2102754-003	EP2102754-004	EP2102754-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD335_210315	0089_SD363_210315	0089_SD341_210315	0089_SD407_210315	0089_SD405_210315
				Sampling date / time	15-Mar-2021 09:22	15-Mar-2021 10:01	15-Mar-2021 10:26	15-Mar-2021 14:19	15-Mar-2021 14:20
Compound	CAS Number	LOR	Unit		EP2102754-001	EP2102754-002	EP2102754-003	EP2102754-004	EP2102754-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**94.5**	**92.5**	**90.5**	**91.0**	**94.0**
13C8-PFOA	----	0.0002	%		**106**	**104**	**102**	**102**	**102**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102754**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Mar-2021
C-O-C number	: 20253	Issue Date	: 23-Mar-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3569143)									
EP2102754-001	0089_SD335_210315	EA002: pH Value	----	0.1	pH Unit	8.6	8.7	1.73	0% - 20%
EP2102757-005	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.8	8.8	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3569142)									
EP2102754-001	0089_SD335_210315	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3980	3990	0.251	0% - 20%
EP2102757-005	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	2510	2500	0.399	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3569155)									
EP2102754-001	0089_SD335_210315	EA055: Moisture Content	----	0.1	%	25.2	24.6	2.22	0% - 20%
EP2102757-005	Anonymous	EA055: Moisture Content	----	0.1	%	17.5	17.1	2.69	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3569136)									
EP2102754-001	0089_SD335_210315	ED008: Exchangeable Sodium Percent	----	0.1	%	3.8	3.5	9.74	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	2.9	2.9	0.00	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.4	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.1	0.1	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	3.5	3.5	0.00	0% - 20%
EP2102757-005	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	1.3	1.4	9.37	0% - 50%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	13.5	11.9	12.7	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	1.3	1.2	9.84	0% - 50%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	15.0	13.3	12.3	0% - 20%
EP004: Organic Matter (QC Lot: 3574704)									
EP2102754-001	0089_SD335_210315	EP004: Organic Matter	----	0.5	%	0.5	0.5	0.00	No Limit
EP2102757-006	Anonymous	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3570377)									
EP2102754-001	0089_SD335_210315	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	0.0005	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP2102757-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3570377)									
EP2102754-001	0089_SD335_210315	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP2102757-006	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3570377)									
EP2102754-001	0089_SD335_210315	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3570377) - continued									
EP2102754-001	0089_SD335_210315	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2102757-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3570377)									
EP2102754-001	0089_SD335_210315	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2102757-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3569143)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	70.0	130
				----	7 pH Unit	99.8	70.0	130
EA010: Conductivity (1:5) (QCLot: 3569142)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
ED008: Exchangeable Cations (QCLot: 3569136)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	90.2	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	93.8	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	105	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	95.2	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	91.0	79.9	110
EP004: Organic Matter (QCLot: 3574704)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	94.3	70.0	120
				<0.5	85 %	86.2	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3570377)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3570377)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	101	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	131	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3570377)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3570377) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	91.0	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	100	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	110	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3570377)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	97.6	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3570377)							
EP2102754-001	0089_SD335_210315	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	117	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	119	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	118	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	112	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	112	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	111	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3570377)							
EP2102754-001	0089_SD335_210315	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	104	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	116	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	105	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	108	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	122	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	123	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	126	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3570377) - continued							
EP2102754-001	0089_SD335_210315	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	119	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	120	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	122	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	99.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3570377)							
EP2102754-001	0089_SD335_210315	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	118	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	102	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	109	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	102	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	95.8	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	114	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	101	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3570377)							
EP2102754-001	0089_SD335_210315	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	119	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	115	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	118	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	103	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102754**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 23-Mar-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 5
Order number	: DEF19009/730	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD335_210315, 0089_SD341_210315, 0089_SD405_210315, 0089_SD363_210315, 0089_SD407_210315,	**15-Mar-2021**	**18-Mar-2021**	22-Mar-2021	✓	**18-Mar-2021**	18-Mar-2021	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD335_210315, 0089_SD341_210315, 0089_SD405_210315, 0089_SD363_210315, 0089_SD407_210315,	**15-Mar-2021**	**18-Mar-2021**	22-Mar-2021	✓	**18-Mar-2021**	15-Apr-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD335_210315, 0089_SD341_210315, 0089_SD405_210315, 0089_SD363_210315, 0089_SD407_210315,	**15-Mar-2021**	**----**	----	----	**17-Mar-2021**	29-Mar-2021	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD335_210315, 0089_SD341_210315, 0089_SD405_210315, 0089_SD363_210315, 0089_SD407_210315,	**15-Mar-2021**	**22-Mar-2021**	12-Apr-2021	✓	**22-Mar-2021**	12-Apr-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD335_210315, 0089_SD341_210315, 0089_SD405_210315, 0089_SD363_210315, 0089_SD407_210315,	**15-Mar-2021**	**19-Mar-2021**	12-Apr-2021	✓	**19-Mar-2021**	12-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD335_210315, 0089_SD341_210315, 0089_SD405_210315, 0089_SD363_210315, 0089_SD407_210315,	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	27-Apr-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD335_210315, 0089_SD363_210315, 0089_SD341_210315, 0089_SD407_210315, 0089_SD405_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	27-Apr-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD335_210315, 0089_SD363_210315, 0089_SD341_210315, 0089_SD407_210315, 0089_SD405_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	27-Apr-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD335_210315, 0089_SD363_210315, 0089_SD341_210315, 0089_SD407_210315, 0089_SD405_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	27-Apr-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD335_210315, 0089_SD363_210315, 0089_SD341_210315, 0089_SD407_210315, 0089_SD405_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	27-Apr-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102754**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20253	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 15-Mar-2021 16:20	Issue Date	: 16-Mar-2021
Client Requested Due Date	: 24-Mar-2021	Scheduled Reporting Date	: **24-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2102754-001	15-Mar-2021 09:22	0089_SD335_210315	✓	✓	✓	✓
EP2102754-002	15-Mar-2021 10:01	0089_SD363_210315	✓	✓	✓	✓
EP2102754-003	15-Mar-2021 10:26	0089_SD341_210315	✓	✓	✓	✓
EP2102754-004	15-Mar-2021 14:19	0089_SD407_210315	✓	✓	✓	✓
EP2102754-005	15-Mar-2021 14:20	0089_SD405_210315	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

(ALS) COC#: **20253** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: [redacted] 15/3/21 1620	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_-SD335		15/03/2021 09:22 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD363		15/03/2021 10:01 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD341		15/03/2021 10:26 AM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD407		15/03/2021 02:19 PM	Soil	ALS: 2 Non ALS: 0	No		X		
005	0089_SD405		15/03/2021 02:20 PM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division
Perth
Work Order Reference
EP2102754

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: **20253** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_-SD335	Soil Glass Jar - Unpreserved	150 mL	00261020060093	Orange	No	
001	0089_-SD335	HDPE Soil Jar	200 mL	00620719085958	Grey	No	
002	0089_SD363	HDPE Soil Jar	200 mL	00620719085942	Grey	No	
002	0089_SD363	Soil Glass Jar - Unpreserved	150 mL	00261020060020	Orange	No	
003	0089_SD341	Soil Glass Jar - Unpreserved	150 mL	00261020040802	Orange	No	
003	0089_SD341	HDPE Soil Jar	200 mL	00620719085996	Grey	No	
004	0089_SD407	HDPE Soil Jar	200 mL	00620719085986	Grey	No	
004	0089_SD407	Soil Glass Jar - Unpreserved	150 mL	00261020060127	Orange	No	
005	0089_SD405	HDPE Soil Jar	200 mL	00620719085719	Grey	No	
005	0089_SD405	Soil Glass Jar - Unpreserved	150 mL	00261020060009	Orange	No	

Total Bottle Count: ALS: 10, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102755**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021 16:20
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20259	Issue Date	: 23-Mar-2021 21:51
Sampler	: [redacted], [redacted]		
Site	: AB DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW202_210315	0089_PW304_210315	0089_MW233_210315	0089_QC104_210315	0089_MW249_210315
			Sampling date / time	15-Mar-2021 10:24	15-Mar-2021 10:31	15-Mar-2021 12:10	15-Mar-2021 12:12	15-Mar-2021 12:20
Compound	CAS Number	LOR	Unit	EP2102755-001	EP2102755-002	EP2102755-003	EP2102755-004	EP2102755-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.91	7.58	8.17	8.19	7.91
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	666	32600	180	188	699
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	505	46	52	1080
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	319	352	127	136	418
Total Alkalinity as CaCO3	----	1	mg/L	319	352	127	136	418
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	47	2190	5	5	29
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	111	16200	15	17	130
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	100	424	42	40	92
Magnesium	7439-95-4	1	mg/L	24	1220	6	5	37
Sodium	7440-23-5	1	mg/L	99	9420	19	18	106
Potassium	7440-09-7	1	mg/L	8	496	3	3	11
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	10.5	510	3.06	3.30	12.6
ø Total Cations	----	0.01	meq/L	11.5	544	3.49	3.27	12.5
ø Ionic Balance	----	0.01	%	4.52	3.26	6.53	0.51	0.38
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	10	12	5	5	20
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.03	<0.02	0.10	0.14	0.11
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW202_210315	0089_PW304_210315	0089_MW233_210315	0089_QC104_210315	0089_MW249_210315
				Sampling date / time	15-Mar-2021 10:24	15-Mar-2021 10:31	15-Mar-2021 12:10	15-Mar-2021 12:12	15-Mar-2021 12:20
Compound	CAS Number	LOR	Unit		EP2102755-001	EP2102755-002	EP2102755-003	EP2102755-004	EP2102755-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.06**	**0.03**	**0.11**	**0.12**	**0.06**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW202_210315	0089_PW304_210315	0089_MW233_210315	0089_QC104_210315	0089_MW249_210315
				Sampling date / time	15-Mar-2021 10:24	15-Mar-2021 10:31	15-Mar-2021 12:10	15-Mar-2021 12:12	15-Mar-2021 12:20
					EP2102755-001	EP2102755-002	EP2102755-003	EP2102755-004	EP2102755-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.09**	**0.03**	**0.21**	**0.26**	**0.17**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.09**	**0.03**	**0.21**	**0.26**	**0.17**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.09**	**0.03**	**0.21**	**0.26**	**0.17**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**75.3**	**76.1**	**70.6**	**93.7**	**85.2**
13C8-PFOA	----	0.02	%		**108**	**106**	**111**	**105**	**99.7**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC301_210315	0089_QC302_210315	0089_QC303_210315	0089_QC401_210315	0089_QC402_210315
				Sampling date / time	15-Mar-2021 14:26	15-Mar-2021 14:27	15-Mar-2021 14:27	15-Mar-2021 14:28	15-Mar-2021 14:28
Compound	CAS Number	LOR	Unit		EP2102755-006	EP2102755-007	EP2102755-008	EP2102755-009	EP2102755-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC301_210315	0089_QC302_210315	0089_QC303_210315	0089_QC401_210315	0089_QC402_210315
				Sampling date / time	15-Mar-2021 14:26	15-Mar-2021 14:27	15-Mar-2021 14:27	15-Mar-2021 14:28	15-Mar-2021 14:28
Compound	CAS Number	LOR	Unit		EP2102755-006	EP2102755-007	EP2102755-008	EP2102755-009	EP2102755-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**95.4**	**94.9**	**90.3**	**96.4**	**95.5**
13C8-PFOA	----	0.02	%		**104**	**104**	**102**	**106**	**107**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC403_210315	0089_PW364_210315	----	----	----
				Sampling date / time	15-Mar-2021 14:29	15-Mar-2021 14:31	----	----	----
Compound	CAS Number	LOR	Unit		EP2102755-011	EP2102755-012	--------	--------	--------
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		----	7.67	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		----	43900	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		----	76	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	120	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		----	120	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	2880	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	21500	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	510	----	----	----
Magnesium	7439-95-4	1	mg/L		----	1640	----	----	----
Sodium	7440-23-5	1	mg/L		----	12800	----	----	----
Potassium	7440-09-7	1	mg/L		----	685	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		----	669	----	----	----
ø Total Cations	----	0.01	meq/L		----	735	----	----	----
ø Ionic Balance	----	0.01	%		----	4.69	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	2	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC403_210315	0089_PW364_210315	----	----	----
				Sampling date / time	15-Mar-2021 14:29	15-Mar-2021 14:31	----	----	----
Compound	CAS Number	LOR	Unit		EP2102755-011	EP2102755-012	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.04**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC403_210315	0089_PW364_210315	----	----	----
				Sampling date / time	15-Mar-2021 14:29	15-Mar-2021 14:31	----	----	----
Compound	CAS Number	LOR	Unit		EP2102755-011	EP2102755-012	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.04**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.04**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.04**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**88.0**	**92.6**	----	----	----
13C8-PFOA	----	0.02	%		**101**	**104**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102755**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20259	Issue Date	: 23-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: AB DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA005P: pH by PC Titrator (QC Lot: 3571637)									
EP2102752-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.41	7.40	0.135	0% - 20%
EP2102752-012	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.65	7.64	0.131	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3571640)									
EP2102755-004	0089_QC104_210315	EA005-P: pH Value	----	0.01	pH Unit	8.19	8.23	0.487	0% - 20%
EP2102758-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.72	7.72	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3577269)									
EP2102752-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	33200	32800	1.12	0% - 20%
EP2102752-009	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	6280	6340	0.982	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3577272)									
EP2102755-004	0089_QC104_210315	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	188	187	0.00	0% - 50%
EP2102758-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	42100	42500	0.827	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3577270)									
EP2102752-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	36	32	10.4	No Limit
EP2102752-011	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	38	36	6.10	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3577273)									
EP2102755-004	0089_QC104_210315	EA025H: Suspended Solids (SS)	----	5	mg/L	52	52	1.92	0% - 50%
EP2102758-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	52	47	10.6	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3571636)									
EP2102752-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	438	437	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	438	437	0.00	0% - 20%
EP2102752-012	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3571636) - continued									
EP2102752-012	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	528	595	11.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	528	595	11.8	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3571639)									
EP2102755-004	0089_QC104_210315	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	136	137	1.06	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	136	137	1.06	0% - 20%
EP2102758-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	112	109	2.08	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	112	109	2.08	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3567550)									
EP2102772-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	12000	11900	0.594	0% - 20%
EP2102772-009	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11000	10800	1.37	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3567551)									
EP2102772-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	49700	49400	0.417	0% - 20%
EP2102772-009	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	32800	33300	1.42	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3568772)									
EP2102755-001	0089_MW202_210315	ED093F: Calcium	7440-70-2	1	mg/L	100	96	3.56	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	24	23	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	99	95	3.70	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	8	7	0.00	No Limit
EP2102800-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	1200	1190	0.979	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1010	1010	0.581	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9230	9200	0.324	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	538	535	0.596	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3572707)									
EP2102755-001	0089_MW202_210315	EP005: Total Organic Carbon	----	1	mg/L	10	9	0.00	No Limit
EP2102756-005	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	11	11	0.00	0% - 50%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3571637)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3571640)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3577269)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.9	88.1	114
				<10	1000 mg/L	102	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3577272)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114
				<10	1000 mg/L	95.4	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3577270)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	92.3	89.1	120
				<5	1000 mg/L	97.6	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3577273)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.7	89.1	120
				<5	1000 mg/L	94.9	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3571636)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	88.5	81.2	126
				<1	200 mg/L	93.0	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3571639)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	88.2	81.2	126
				<1	200 mg/L	90.8	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3567550)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	87.7	113
				<1	500 mg/L	106	87.7	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 3567551)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3568772)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.0	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.5	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.9	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.1	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3572707)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	111	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3569582)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	87.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	91.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	85.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	86.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	82.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	86.8	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3571233)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	112	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	120	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	110	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	113	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3569582)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	85.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	88.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	89.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	82.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	91.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	113	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	116	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	124	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	114	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	85.2	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3571233)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	105	73.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3571233) - continued								
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	114	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	114	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	107	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	103	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3569582)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	111	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	95.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	100	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	95.1	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	127	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	105	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3571233)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	114	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	112	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	114	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	103	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	115	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	118	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3569582)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	85.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	95.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	108	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	111	71.4	144

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3571233)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	116	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	117	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	112	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	108	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3567550)							
EP2102772-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3567551)							
EP2102772-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3572707)							
EP2102755-003	0089_MW233_210315	EP005: Total Organic Carbon	----	100 mg/L	109	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102755**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Site	: AB DEF19009/Stirling GW	Issue Date	: 23-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 12
Order number	: DEF19009/730	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102772--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102772--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW202_210315,	0089_PW304_210315,	----	----	----	18-Mar-2021	15-Mar-2021	**3**
0089_MW233_210315,	0089_QC104_210315,						
0089_MW249_210315,	0089_PW364_210315						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	28	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	28	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315, 0089_QC104_210315, 0089_MW249_210315, 0089_PW364_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	15-Mar-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315, 0089_QC104_210315, 0089_MW249_210315, 0089_PW364_210315	**15-Mar-2021**	**----**	----	----	**22-Mar-2021**	22-Mar-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315, 0089_QC104_210315, 0089_MW249_210315, 0089_PW364_210315	**15-Mar-2021**	**----**	----	----	**22-Mar-2021**	22-Mar-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315, 0089_QC104_210315, 0089_MW249_210315, 0089_PW364_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	29-Mar-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315, 0089_QC104_210315, 0089_MW249_210315, 0089_PW364_210315	**15-Mar-2021**	**----**	----	----	**19-Mar-2021**	12-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315, 0089_QC104_210315, 0089_MW249_210315, 0089_PW364_210315	**15-Mar-2021**	**----**	----	----	**19-Mar-2021**	12-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315, 0089_QC104_210315, 0089_MW249_210315, 0089_PW364_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	22-Mar-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315, 0089_QC104_210315, 0089_MW249_210315, 0089_PW364_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	12-Apr-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	11-Sep-2021	✓
HDPE (no PTFE) (EP231X) 0089_QC104_210315, 0089_MW249_210315, 0089_QC301_210315, 0089_QC302_210315, 0089_QC303_210315, 0089_QC401_210315, 0089_QC402_210315, 0089_QC403_210315, 0089_PW364_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) 0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	11-Sep-2021	✓
HDPE (no PTFE) (EP231X) 0089_QC104_210315, 0089_MW249_210315, 0089_QC301_210315, 0089_QC302_210315, 0089_QC303_210315, 0089_QC401_210315, 0089_QC402_210315, 0089_QC403_210315, 0089_PW364_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) 0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	11-Sep-2021	✓
HDPE (no PTFE) (EP231X) 0089_QC104_210315, 0089_MW249_210315, 0089_QC301_210315, 0089_QC302_210315, 0089_QC303_210315, 0089_QC401_210315, 0089_QC402_210315, 0089_QC403_210315, 0089_PW364_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	11-Sep-2021	✓
HDPE (no PTFE) (EP231X) 0089_QC104_210315, 0089_MW249_210315, 0089_QC301_210315, 0089_QC302_210315, 0089_QC303_210315, 0089_QC401_210315, 0089_QC402_210315, 0089_QC403_210315, 0089_PW364_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) 0089_MW202_210315, 0089_PW304_210315, 0089_MW233_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	11-Sep-2021	✓
HDPE (no PTFE) (EP231X) 0089_QC104_210315, 0089_MW249_210315, 0089_QC301_210315, 0089_QC302_210315, 0089_QC303_210315, 0089_QC401_210315, 0089_QC402_210315, 0089_QC403_210315, 0089_PW364_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	28	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	28	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102755**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20259	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: AB DEF19009/Stirling GW		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 15-Mar-2021 16:20	Issue Date	: 16-Mar-2021
Client Requested Due Date	: 24-Mar-2021	Scheduled Reporting Date	: **24-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102755-001	15-Mar-2021 10:24	0089_MW202_210315	✓	✓	✓	✓	✓	✓	✓
EP2102755-002	15-Mar-2021 10:31	0089_PW304_210315	✓	✓	✓	✓	✓	✓	✓
EP2102755-003	15-Mar-2021 12:10	0089_MW233_210315	✓	✓	✓	✓	✓	✓	✓
EP2102755-004	15-Mar-2021 12:12	0089_QC104_210315	✓	✓	✓	✓	✓	✓	✓
EP2102755-005	15-Mar-2021 12:20	0089_MW249_210315	✓	✓	✓	✓	✓	✓	✓
EP2102755-012	15-Mar-2021 14:31	0089_PW364_210315	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102755-001	15-Mar-2021 10:24	0089_MW202_210315	✓
EP2102755-002	15-Mar-2021 10:31	0089_PW304_210315	✓
EP2102755-003	15-Mar-2021 12:10	0089_MW233_210315	✓
EP2102755-004	15-Mar-2021 12:12	0089_QC104_210315	✓
EP2102755-005	15-Mar-2021 12:20	0089_MW249_210315	✓
EP2102755-006	15-Mar-2021 14:26	0089_QC301_210315	✓
EP2102755-007	15-Mar-2021 14:27	0089_QC302_210315	✓
EP2102755-008	15-Mar-2021 14:27	0089_QC303_210315	✓
EP2102755-009	15-Mar-2021 14:28	0089_QC401_210315	✓
EP2102755-010	15-Mar-2021 14:28	0089_QC402_210315	✓
EP2102755-011	15-Mar-2021 14:29	0089_QC403_210315	✓
EP2102755-012	15-Mar-2021 14:31	0089_PW364_210315	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]
[redacted]		
- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

COC#: **20259** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 15/3/21 1620	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW202		15/03/2021 10:24 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
002	0089_PW304		15/03/2021 10:31 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
003	0089_MW233		15/03/2021 12:10 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
004	0089_QC104		15/03/2021 12:12 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
005	0089_MW249		15/03/2021 12:20 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
006	0089_QC301		15/03/2021 02:26 PM	Water	ALS: 1 Non ALS: 1	No		X			
007	0089_QC302		15/03/2021 02:27 PM	Water	ALS: 2 Non ALS: 0	No		X			
008	0089_QC303		15/03/2021 02:27 PM	Water	ALS: 2 Non ALS: 0	No		X			
009	0089_QC401		15/03/2021 02:28 PM	Water	ALS: 2 Non ALS: 0	No		X			

Environmental Division
Perth
Work Order Reference
EP2102755

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 20259 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_QC402		15/03/2021 02:28 PM	Water	ALS: 2 Non ALS: 0	No		X			
011	0089_QC403		15/03/2021 02:29 PM	Water	ALS: 2 Non ALS: 0	No		X			
012	0089_PW364		15/03/2021 02:31 PM	Water	ALS: 5 Non ALS: 1	No	Partial 7/8		X		

CHAIN OF CUSTODY

ALS COC#: **20259** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW202	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW304	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW233	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_QC104	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW249	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **20259** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

012	0089_PW364	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **20259** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW202	Clear Plastic Bottle - Natural	250 mL	00070719175478	Green	No	
001	0089_MW202	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001279	Purple	No	
001	0089_MW202	HDPE (no PTFE)	20 mL	00352010071532	Grey	No	
001	0089_MW202	HDPE (no PTFE)	20 mL	00352010071306	Grey	No	
002	0089_PW304	Clear Plastic Bottle - Natural	250 mL	00070719175457	Green	No	
002	0089_PW304	HDPE (no PTFE)	20 mL	00352010071290	Grey	No	
002	0089_PW304	HDPE (no PTFE)	20 mL	00352010071335	Grey	No	
002	0089_PW304	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001788	Purple	No	
003	0089_MW233	Clear Plastic Bottle - Natural	250 mL	00070719175471	Green	No	
003	0089_MW233	HDPE (no PTFE)	20 mL	00352010071564	Grey	No	
003	0089_MW233	HDPE (no PTFE)	20 mL	00352010071278	Grey	No	
003	0089_MW233	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001824	Purple	No	
004	0089_QC104	Clear Plastic Bottle - Natural	250 mL	00070719175544	Green	No	
004	0089_QC104	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001511	Purple	No	
004	0089_QC104	HDPE (no PTFE)	20 mL	00352010071594	Grey	No	
004	0089_QC104	HDPE (no PTFE)	20 mL	00352010071692	Grey	No	
005	0089_MW249	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049453	Purple	No	
005	0089_MW249	HDPE (no PTFE)	20 mL	00352010071360	Grey	No	
005	0089_MW249	HDPE (no PTFE)	20 mL	00352010071617	Grey	No	
005	0089_MW249	Clear Plastic Bottle - Natural	250 mL	00070719175520	Green	No	
006	0089_QC301	HDPE (no PTFE)	20 mL	00352010071423	Grey	No	
007	0089_QC302	HDPE (no PTFE)	20 mL	00352010071474	Grey	No	
007	0089_QC302	HDPE (no PTFE)	20 mL	00352010071681	Grey	No	
008	0089_QC303	HDPE (no PTFE)	20 mL	00352010071331	Grey	No	
008	0089_QC303	HDPE (no PTFE)	20 mL	00352010071449	Grey	No	
009	0089_QC401	HDPE (no PTFE)	20 mL	00352010071653	Grey	No	

CHAIN OF CUSTODY

ALS COC#: **20259** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

009	0089_QC401	HDPE (no PTFE)	20 mL	00352010071338	Grey	No	
010	0089_QC402	HDPE (no PTFE)	20 mL	00352010071324	Grey	No	
010	0089_QC402	HDPE (no PTFE)	20 mL	00352010071678	Grey	No	
011	0089_QC403	HDPE (no PTFE)	20 mL	00352010071319	Grey	No	
011	0089_QC403	HDPE (no PTFE)	20 mL	00352010071234	Grey	No	
012	0089_PW364	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001417	Purple	No	
012	0089_PW364	HDPE (no PTFE)	20 mL	00352010071212	Grey	No	
012	0089_PW364	HDPE (no PTFE)	20 mL	00352010071366	Grey	No	
012	0089_PW364	HDPE (no PTFE)	20 mL	00352010071125	Grey	No	
012	0089_PW364	Clear Plastic Bottle - Natural	250 mL	00070719175449	Green	No	

Total Bottle Count: ALS: 36, Non ALS: 2

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102756**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021 16:20
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20261	Issue Date	: 24-Mar-2021 16:20
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW134_210315	0089_SW132_210315	0089_SW408_210315	0089_SW406_210315	0089_SW130_210315
			Sampling date / time	15-Mar-2021 10:29	15-Mar-2021 10:53	15-Mar-2021 14:23	15-Mar-2021 14:25	15-Mar-2021 14:33
Compound	CAS Number	LOR	Unit	EP2102756-001	EP2102756-002	EP2102756-003	EP2102756-004	EP2102756-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.03	7.92	7.10	7.57	7.92
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	42700	43500	42000	43500	41000
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	172	574	138	128	643
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	113	118	118	116	108
Total Alkalinity as CaCO3	----	1	mg/L	113	118	118	116	108
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2740	2790	2810	2840	2850
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18900	20800	19000	18800	18700
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	495	424	489	475	491
Magnesium	7439-95-4	1	mg/L	1590	1290	1560	1510	1570
Sodium	7440-23-5	1	mg/L	12600	11700	12400	12000	12500
Potassium	7440-09-7	1	mg/L	666	392	664	640	658
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	592	647	597	592	589
ø Total Cations	----	0.01	meq/L	721	646	709	686	714
ø Ionic Balance	----	0.01	%	9.76	0.07	8.60	7.40	9.61
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	5	13	102	84	11
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW134_210315	0089_SW132_210315	0089_SW408_210315	0089_SW406_210315	0089_SW130_210315
				Sampling date / time	15-Mar-2021 10:29	15-Mar-2021 10:53	15-Mar-2021 14:23	15-Mar-2021 14:25	15-Mar-2021 14:33
Compound	CAS Number	LOR	Unit		EP2102756-001	EP2102756-002	EP2102756-003	EP2102756-004	EP2102756-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.03**	**0.03**	<0.01	**0.02**	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW134_210315	0089_SW132_210315	0089_SW408_210315	0089_SW406_210315	0089_SW130_210315
				Sampling date / time	15-Mar-2021 10:29	15-Mar-2021 10:53	15-Mar-2021 14:23	15-Mar-2021 14:25	15-Mar-2021 14:33
Compound	CAS Number	LOR	Unit		EP2102756-001	EP2102756-002	EP2102756-003	EP2102756-004	EP2102756-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.03**	**0.03**	<0.01	**0.02**	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.03**	**0.03**	<0.01	**0.02**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.03**	**0.03**	<0.01	**0.02**	**0.02**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**88.5**	**91.1**	**89.6**	**84.1**	**102**
13C8-PFOA	----	0.02	%		**96.5**	**86.4**	**112**	**119**	**87.5**

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102756**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20261	Issue Date	: 24-Mar-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3571640)									
EP2102755-004	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.19	8.23	0.487	0% - 20%
EP2102758-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.72	7.72	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3577272)									
EP2102755-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	188	187	0.00	0% - 50%
EP2102758-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	42100	42500	0.827	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3577273)									
EP2102755-004	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	52	52	1.92	0% - 50%
EP2102758-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	52	47	10.6	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3571639)									
EP2102755-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	136	137	1.06	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	136	137	1.06	0% - 20%
EP2102758-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	112	109	2.08	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	112	109	2.08	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3567235)									
EP2102756-001	0089_SW134_210315	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2740	2720	0.512	0% - 20%
EP2102758-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2890	2840	1.81	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3567236)									
EP2102756-001	0089_SW134_210315	ED045G: Chloride	16887-00-6	1	mg/L	18900	18700	1.16	0% - 20%
EP2102758-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	21000	21200	0.717	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3568775)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3568775) - continued									
EP2102752-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	482	486	0.684	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1210	1220	0.562	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9100	9140	0.349	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	459	463	0.868	0% - 20%
EP2102752-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	140	143	1.91	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	109	110	0.976	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	568	564	0.809	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	50	50	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3568776)									
EP2102756-005	0089_SW130_210315	ED093F: Calcium	7440-70-2	1	mg/L	491	498	1.44	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1570	1590	1.11	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12500	12700	1.63	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	658	668	1.43	0% - 20%
EP2102758-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	488	509	4.36	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1550	1620	4.37	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12400	13000	4.50	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	649	681	4.80	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3572707)									
EP2102755-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	10	9	0.00	No Limit
EP2102756-005	0089_SW130_210315	EP005: Total Organic Carbon	----	1	mg/L	11	11	0.00	0% - 50%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3571640)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3577272)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114
				<10	1000 mg/L	95.4	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3577273)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.7	89.1	120
				<5	1000 mg/L	94.9	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3571639)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	88.2	81.2	126
				<1	200 mg/L	90.8	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3567235)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	87.7	113
				<1	500 mg/L	105	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3567236)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	87.9	114
				<1	1000 mg/L	93.2	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3568775)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	94.7	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.5	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.0	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3568776)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.2	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.1	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.0	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3572707)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	111	87.2	116
				<1	100 mg/L	109	87.2	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3570717)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	97.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	96.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	111	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3570717)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	102	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	125	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	117	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	96.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	92.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	92.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3570717)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	108	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	74.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	82.0	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	91.3	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	112	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	116	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3570717)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	104	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	118	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	120	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	120	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3567235)							
EP2102756-001	0089_SW134_210315	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3567236)							
EP2102756-001	0089_SW134_210315	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3572707)							
EP2102755-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	109	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102756**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 24-Mar-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 5
Order number	: DEF19009/730	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102756--001	0089_SW134_210315	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102756--001	0089_SW134_210315	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_SW134_210315, 0089_SW408_210315, 0089_SW130_210315	0089_SW132_210315, 0089_SW406_210315,	----	----	----	18-Mar-2021	15-Mar-2021	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	15-Mar-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**----**	----	----	**22-Mar-2021**	22-Mar-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**----**	----	----	**22-Mar-2021**	22-Mar-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	29-Mar-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**----**	----	----	**23-Mar-2021**	12-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**----**	----	----	**23-Mar-2021**	12-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	22-Mar-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	12-Apr-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**19-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**19-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**19-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**19-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW134_210315, 0089_SW132_210315, 0089_SW408_210315, 0089_SW406_210315, 0089_SW130_210315	**15-Mar-2021**	**19-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	20	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	20	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102756**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20261	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 15-Mar-2021 16:20	Issue Date	: 16-Mar-2021
Client Requested Due Date	: 24-Mar-2021	Scheduled Reporting Date	: **24-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102756-001	15-Mar-2021 10:29	0089_SW134_210315	✓	✓	✓	✓	✓	✓	✓
EP2102756-002	15-Mar-2021 10:53	0089_SW132_210315	✓	✓	✓	✓	✓	✓	✓
EP2102756-003	15-Mar-2021 14:23	0089_SW408_210315	✓	✓	✓	✓	✓	✓	✓
EP2102756-004	15-Mar-2021 14:25	0089_SW406_210315	✓	✓	✓	✓	✓	✓	✓
EP2102756-005	15-Mar-2021 14:33	0089_SW130_210315	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102756-001	15-Mar-2021 10:29	0089_SW134_210315	✓
EP2102756-002	15-Mar-2021 10:53	0089_SW132_210315	✓
EP2102756-003	15-Mar-2021 14:23	0089_SW408_210315	✓
EP2102756-004	15-Mar-2021 14:25	0089_SW406_210315	✓
EP2102756-005	15-Mar-2021 14:33	0089_SW130_210315	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]
[redacted]		
- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

COC#: **20261** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 15/3/21 1620	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW134		15/03/2021 10:29 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_SW132		15/03/2021 10:53 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_SW408		15/03/2021 02:23 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_SW406		15/03/2021 02:25 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_SW130		15/03/2021 02:33 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2102756

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 20261 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW134	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_SW132	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_SW408	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW406	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_SW130	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **20261** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW134	Clear Plastic Bottle - Natural	250 mL	00070719175433	Green	No	
001	0089_SW134	HDPE (no PTFE)	20 mL	00352010071133	Grey	No	
001	0089_SW134	HDPE (no PTFE)	20 mL	00352010071677	Grey	No	
001	0089_SW134	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001468	Purple	No	
002	0089_SW132	Clear Plastic Bottle - Natural	250 mL	00070719175470	Green	No	
002	0089_SW132	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001573	Purple	No	
002	0089_SW132	HDPE (no PTFE)	20 mL	00352010071181	Grey	No	
002	0089_SW132	HDPE (no PTFE)	20 mL	00352010071357	Grey	No	
003	0089_SW408	Clear Plastic Bottle - Natural	250 mL	00070719175442	Green	No	
003	0089_SW408	HDPE (no PTFE)	20 mL	00352010071249	Grey	No	
003	0089_SW408	HDPE (no PTFE)	20 mL	00352010071259	Grey	No	
003	0089_SW408	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001844	Purple	No	
004	0089_SW406	Clear Plastic Bottle - Natural	250 mL	00070719175422	Green	No	
004	0089_SW406	HDPE (no PTFE)	20 mL	00352010071310	Grey	No	
004	0089_SW406	HDPE (no PTFE)	20 mL	00352010071400	Grey	No	
004	0089_SW406	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001770	Purple	No	
005	0089_SW130	Clear Plastic Bottle - Natural	250 mL	00070719175510	Green	No	
005	0089_SW130	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001763	Purple	No	
005	0089_SW130	HDPE (no PTFE)	20 mL	00352010071880	Grey	No	
005	0089_SW130	HDPE (no PTFE)	20 mL	00352010080748	Grey	No	

Total Bottle Count: ALS: 20, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102757**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021 16:20
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Mar-2021
C-O-C number	: 20263	Issue Date	: 23-Mar-2021 21:53
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 11		
No. of samples analysed	: 11		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD304_210315	0089_SD368_210315	0089_QC101_210315	0089_SD367_210315	0089_SD374_210315
				Sampling date / time	15-Mar-2021 10:34	15-Mar-2021 11:02	15-Mar-2021 11:04	15-Mar-2021 11:30	15-Mar-2021 13:00
					EP2102757-001	EP2102757-002	EP2102757-003	EP2102757-004	EP2102757-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**8.4**	**8.7**	**8.7**	**8.3**	**8.8**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**3060**	**2550**	**3060**	**4520**	**2510**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**26.6**	**25.8**	**25.2**	**31.4**	**17.5**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**3.1**	**3.0**	**2.5**	**15.4**	**13.5**
Exchangeable Magnesium	----	0.1	meq/100g		**0.5**	**0.4**	**0.4**	**1.9**	**1.3**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		<0.1	<0.1	<0.1	**0.3**	**0.2**
Cation Exchange Capacity	----	0.1	meq/100g		**3.7**	**3.5**	**3.0**	**17.6**	**15.0**
Exchangeable Sodium Percent	----	0.1	%		**2.6**	**2.8**	**2.9**	**1.8**	**1.3**
EP004: Organic Matter									
Organic Matter	----	0.5	%		**0.8**	<0.5	<0.5	**0.8**	**0.6**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD304_210315	0089_SD368_210315	0089_QC101_210315	0089_SD367_210315	0089_SD374_210315
				Sampling date / time	15-Mar-2021 10:34	15-Mar-2021 11:02	15-Mar-2021 11:04	15-Mar-2021 11:30	15-Mar-2021 13:00
Compound	CAS Number	LOR	Unit		EP2102757-001	EP2102757-002	EP2102757-003	EP2102757-004	EP2102757-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD304_210315	0089_SD368_210315	0089_QC101_210315	0089_SD367_210315	0089_SD374_210315
				Sampling date / time	15-Mar-2021 10:34	15-Mar-2021 11:02	15-Mar-2021 11:04	15-Mar-2021 11:30	15-Mar-2021 13:00
Compound	CAS Number	LOR	Unit		EP2102757-001	EP2102757-002	EP2102757-003	EP2102757-004	EP2102757-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**95.0**	**93.5**	**92.0**	**87.0**	**93.5**
13C8-PFOA	----	0.0002	%		**102**	**104**	**106**	**102**	**104**

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC105_210315	0089_SD375_210315	0089_SD378_210315	0089_SD362_210315	0089_SD340_210315
				Sampling date / time	15-Mar-2021 13:01	15-Mar-2021 13:29	15-Mar-2021 13:47	15-Mar-2021 14:32	15-Mar-2021 14:33
					EP2102757-006	EP2102757-007	EP2102757-008	EP2102757-009	EP2102757-010
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**8.8**	**8.8**	**8.8**	**8.6**	**8.6**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**2880**	**2700**	**1950**	**4400**	**3760**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**18.6**	**18.4**	**12.0**	**24.2**	**25.0**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**2.4**	**5.1**	**11.5**	**2.4**	**2.7**
Exchangeable Magnesium	----	0.1	meq/100g		**0.4**	**0.6**	**1.1**	**0.4**	**0.4**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		**0.1**	**0.1**	**0.2**	**0.1**	<0.1
Cation Exchange Capacity	----	0.1	meq/100g		**3.0**	**5.9**	**12.7**	**2.9**	**3.2**
Exchangeable Sodium Percent	----	0.1	%		**3.9**	**2.4**	**1.3**	**3.6**	**3.1**
EP004: Organic Matter									
Organic Matter	----	0.5	%		<0.5	<0.5	**0.5**	<0.5	<0.5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	**0.0002**	<0.0002	**0.0002**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_QC105_210315	0089_SD375_210315	0089_SD378_210315	0089_SD362_210315	0089_SD340_210315
				Sampling date / time	15-Mar-2021 13:01	15-Mar-2021 13:29	15-Mar-2021 13:47	15-Mar-2021 14:32	15-Mar-2021 14:33
Compound	CAS Number	LOR	Unit		EP2102757-006	EP2102757-007	EP2102757-008	EP2102757-009	EP2102757-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	**0.0002**	<0.0002	**0.0002**	<0.0002

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC105_210315	0089_SD375_210315	0089_SD378_210315	0089_SD362_210315	0089_SD340_210315
				Sampling date / time	15-Mar-2021 13:01	15-Mar-2021 13:29	15-Mar-2021 13:47	15-Mar-2021 14:32	15-Mar-2021 14:33
					EP2102757-006	EP2102757-007	EP2102757-008	EP2102757-009	EP2102757-010
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	**0.0002**	<0.0002	**0.0002**	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	**0.0002**	<0.0002	**0.0002**	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**94.5**	**91.5**	**89.5**	**90.0**	**97.5**
13C8-PFOA	----	0.0002	%		**104**	**103**	**102**	**105**	**110**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD364_210315	----	----	----	----
			Sampling date / time	15-Mar-2021 14:34	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2102757-011	--------	--------	--------	--------
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**8.6**	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**3880**	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**24.6**	----	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**2.6**	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.4**	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**3.1**	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**2.9**	----	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD364_210315	----	----	----	----
				Sampling date / time	15-Mar-2021 14:34	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102757-011	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)				Sample ID	**0089_SD364_210315**	**----**	**----**	**----**	**----**
				Sampling date / time	15-Mar-2021 14:34	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2102757-011**	**--------**	**--------**	**--------**	**--------**
					Result	----	----	----	----
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	**----**	**----**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	**----**	**----**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**88.0**	**----**	**----**	**----**	**----**
13C8-PFOA	----	0.0002	%		**105**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102757**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Mar-2021
C-O-C number	: 20263	Issue Date	: 23-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 11		
No. of samples analysed	: 11		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3569143)									
EP2102754-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.6	8.7	1.73	0% - 20%
EP2102757-005	0089_SD374_210315	EA002: pH Value	----	0.1	pH Unit	8.8	8.8	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3569142)									
EP2102754-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3980	3990	0.251	0% - 20%
EP2102757-005	0089_SD374_210315	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	2510	2500	0.399	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3569155)									
EP2102754-001	Anonymous	EA055: Moisture Content	----	0.1	%	25.2	24.6	2.22	0% - 20%
EP2102757-005	0089_SD374_210315	EA055: Moisture Content	----	0.1	%	17.5	17.1	2.69	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3569136)									
EP2102754-001	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	3.8	3.5	9.74	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	2.9	2.9	0.00	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.4	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.1	0.1	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	3.5	3.5	0.00	0% - 20%
EP2102757-005	0089_SD374_210315	ED008: Exchangeable Sodium Percent	----	0.1	%	1.3	1.4	9.37	0% - 50%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	13.5	11.9	12.7	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	1.3	1.2	9.84	0% - 50%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	15.0	13.3	12.3	0% - 20%
EP004: Organic Matter (QC Lot: 3574704)									
EP2102754-001	Anonymous	EP004: Organic Matter	----	0.5	%	0.5	0.5	0.00	No Limit
EP2102757-006	0089_QC105_210315	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3570377)									
EP2102754-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	0.0005	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP2102757-006	0089_QC105_210315	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3570377)									
EP2102754-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP2102757-006	0089_QC105_210315	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3570377)									
EP2102754-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3570377) - continued									
EP2102754-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2102757-006	0089_QC105_210315	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3570377)									
EP2102754-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2102757-006	0089_QC105_210315	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3569143)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	70.0	130
				----	7 pH Unit	99.8	70.0	130
EA010: Conductivity (1:5) (QCLot: 3569142)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
ED008: Exchangeable Cations (QCLot: 3569136)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	90.2	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	93.8	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	105	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	95.2	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	91.0	79.9	110
EP004: Organic Matter (QCLot: 3574704)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	94.3	70.0	120
				<0.5	85 %	86.2	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3570377)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3570377)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	101	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	131	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3570377)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3570377) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	91.0	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	100	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	110	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3570377)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	97.6	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3570377)							
EP2102754-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	117	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	119	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	118	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	112	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	112	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	111	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3570377)							
EP2102754-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	104	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	116	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	105	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	108	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	122	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	123	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	126	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3570377) - continued							
EP2102754-001	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	119	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	120	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	122	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	99.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3570377)							
EP2102754-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	118	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	102	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	109	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	102	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	95.8	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	114	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	101	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3570377)							
EP2102754-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	119	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	115	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	118	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	103	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102757**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 23-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 11
Order number	: DEF19009/730	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD304_210315, 0089_QC101_210315, 0089_SD374_210315, 0089_SD375_210315, 0089_SD362_210315, 0089_SD364_210315, 0089_SD368_210315, 0089_SD367_210315, 0089_QC105_210315, 0089_SD378_210315, 0089_SD340_210315,	**15-Mar-2021**	**18-Mar-2021**	22-Mar-2021	✓	**18-Mar-2021**	18-Mar-2021	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD304_210315, 0089_QC101_210315, 0089_SD374_210315, 0089_SD375_210315, 0089_SD362_210315, 0089_SD364_210315, 0089_SD368_210315, 0089_SD367_210315, 0089_QC105_210315, 0089_SD378_210315, 0089_SD340_210315,	**15-Mar-2021**	**18-Mar-2021**	22-Mar-2021	✓	**18-Mar-2021**	15-Apr-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD304_210315, 0089_QC101_210315, 0089_SD374_210315, 0089_SD375_210315, 0089_SD362_210315, 0089_SD364_210315, 0089_SD368_210315, 0089_SD367_210315, 0089_QC105_210315, 0089_SD378_210315, 0089_SD340_210315,	**15-Mar-2021**	**----**	----	----	**17-Mar-2021**	29-Mar-2021	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD304_210315, 0089_QC101_210315, 0089_SD374_210315, 0089_SD375_210315, 0089_SD362_210315, 0089_SD364_210315, 0089_SD368_210315, 0089_SD367_210315, 0089_QC105_210315, 0089_SD378_210315, 0089_SD340_210315,	**15-Mar-2021**	**22-Mar-2021**	12-Apr-2021	✓	**22-Mar-2021**	12-Apr-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD304_210315, 0089_QC101_210315, 0089_SD374_210315, 0089_SD375_210315, 0089_SD362_210315, 0089_SD364_210315, 0089_SD368_210315, 0089_SD367_210315, 0089_QC105_210315, 0089_SD378_210315, 0089_SD340_210315,	**15-Mar-2021**	**19-Mar-2021**	12-Apr-2021	✓	**19-Mar-2021**	12-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD304_210315, 0089_QC101_210315, 0089_SD374_210315, 0089_SD375_210315, 0089_SD362_210315, 0089_SD364_210315, 0089_SD368_210315, 0089_SD367_210315, 0089_QC105_210315, 0089_SD378_210315, 0089_SD340_210315,	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	27-Apr-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD304_210315, 0089_QC101_210315, 0089_SD374_210315, 0089_SD375_210315, 0089_SD362_210315, 0089_SD364_210315, 0089_SD368_210315, 0089_SD367_210315, 0089_QC105_210315, 0089_SD378_210315, 0089_SD340_210315,	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	27-Apr-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD304_210315, 0089_QC101_210315, 0089_SD374_210315, 0089_SD375_210315, 0089_SD362_210315, 0089_SD364_210315, 0089_SD368_210315, 0089_SD367_210315, 0089_QC105_210315, 0089_SD378_210315, 0089_SD340_210315,	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	27-Apr-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD304_210315, 0089_QC101_210315, 0089_SD374_210315, 0089_SD375_210315, 0089_SD362_210315, 0089_SD364_210315, 0089_SD368_210315, 0089_SD367_210315, 0089_QC105_210315, 0089_SD378_210315, 0089_SD340_210315,	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	27-Apr-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD304_210315, 0089_SD368_210315, 0089_QC101_210315, 0089_SD367_210315, 0089_SD374_210315, 0089_QC105_210315, 0089_SD375_210315, 0089_SD378_210315, 0089_SD362_210315, 0089_SD340_210315, 0089_SD364_210315	**15-Mar-2021**	**18-Mar-2021**	11-Sep-2021	✓	**18-Mar-2021**	27-Apr-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102757**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20263	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 15-Mar-2021 16:20	Issue Date	: 16-Mar-2021
Client Requested Due Date	: 24-Mar-2021	Scheduled Reporting Date	: **24-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 11 / 11

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2102757-001	15-Mar-2021 10:34	0089_SD304_210315	✓	✓	✓	✓
EP2102757-002	15-Mar-2021 11:02	0089_SD368_210315	✓	✓	✓	✓
EP2102757-003	15-Mar-2021 11:04	0089_QC101_210315	✓	✓	✓	✓
EP2102757-004	15-Mar-2021 11:30	0089_SD367_210315	✓	✓	✓	✓
EP2102757-005	15-Mar-2021 13:00	0089_SD374_210315	✓	✓	✓	✓
EP2102757-006	15-Mar-2021 13:01	0089_QC105_210315	✓	✓	✓	✓
EP2102757-007	15-Mar-2021 13:29	0089_SD375_210315	✓	✓	✓	✓
EP2102757-008	15-Mar-2021 13:47	0089_SD378_210315	✓	✓	✓	✓
EP2102757-009	15-Mar-2021 14:32	0089_SD362_210315	✓	✓	✓	✓
EP2102757-010	15-Mar-2021 14:33	0089_SD340_210315	✓	✓	✓	✓
EP2102757-011	15-Mar-2021 14:34	0089_SD364_210315	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 20263 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: [redacted] 15/3/21 1620	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD304		15/03/2021 10:34 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD368		15/03/2021 11:02 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_QC101		15/03/2021 11:04 AM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD367		15/03/2021 11:30 AM	Soil	ALS: 2 Non ALS: 0	No		X		
005	0089_SD374		15/03/2021 01:00 PM	Soil	ALS: 2 Non ALS: 0	No		X		
006	0089_QC105		15/03/2021 01:01 PM	Soil	ALS: 2 Non ALS: 0	No		X		
007	0089_SD375		15/03/2021 01:29 PM	Soil	ALS: 2 Non ALS: 0	No		X		
008	0089_SD378		15/03/2021 01:47 PM	Soil	ALS: 2 Non ALS: 0	No		X		
009	0089_SD362		15/03/2021 02:32 PM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division
Perth
Work Order Reference
EP2102757

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: **20263** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO [redacted]

EMAIL INVOICES TO

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SD340		15/03/2021 02:33 PM	Soil	ALS: 2 Non ALS: 0	No		X		
011	0089_SD364		15/03/2021 02:34 PM	Soil	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

COC#: 20263 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD304	HDPE Soil Jar	200 mL	00620719085962	Grey	No	
001	0089_SD304	Soil Glass Jar - Unpreserved	150 mL	00261020060103	Orange	No	
002	0089_SD368	Soil Glass Jar - Unpreserved	150 mL	00261020040817	Orange	No	
002	0089_SD368	HDPE Soil Jar	200 mL	00620719085980	Grey	No	
003	0089_QC101	Soil Glass Jar - Unpreserved	150 mL	00261020040800	Orange	No	
003	0089_QC101	HDPE Soil Jar	200 mL	00620719085940	Grey	No	
004	0089_SD367	HDPE Soil Jar	200 mL	00620719085952	Grey	No	
004	0089_SD367	Soil Glass Jar - Unpreserved	150 mL	00261020060130	Orange	No	
005	0089_SD374	HDPE Soil Jar	200 mL	00620719083592	Grey	No	
005	0089_SD374	Soil Glass Jar - Unpreserved	150 mL	00261020040777	Orange	No	
006	0089_QC105	HDPE Soil Jar	200 mL	00620719085948	Grey	No	
006	0089_QC105	Soil Glass Jar - Unpreserved	150 mL	00261020060131	Orange	No	
007	0089_SD375	HDPE Soil Jar	200 mL	00620719085758	Grey	No	
007	0089_SD375	Soil Glass Jar - Unpreserved	150 mL	00261020060043	Orange	No	
008	0089_SD378	Soil Glass Jar - Unpreserved	150 mL	00261020040792	Orange	No	
008	0089_SD378	HDPE Soil Jar	200 mL	00620719085989	Grey	No	
009	0089_SD362	HDPE Soil Jar	200 mL	00620719085729	Grey	No	
009	0089_SD362	Soil Glass Jar - Unpreserved	150 mL	00261020060027	Orange	No	
010	0089_SD340	HDPE Soil Jar	200 mL	00620719085977	Grey	No	
010	0089_SD340	Soil Glass Jar - Unpreserved	150 mL	00261020060173	Orange	No	
011	0089_SD364	HDPE Soil Jar	200 mL	00620719085985	Grey	No	
011	0089_SD364	Soil Glass Jar - Unpreserved	150 mL	00261020060109	Orange	No	

Total Bottle Count: ALS: 22, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102758**	Page	: 1 of 15
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021 16:20
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20264	Issue Date	: 24-Mar-2021 17:13
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 15		
No. of samples analysed	: 15		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW368_210315	0089_QC102_210315	0089_PW367_210315	0089_PW374_210315	0089_QC106_210315
			Sampling date / time	15-Mar-2021 10:47	15-Mar-2021 10:52	15-Mar-2021 11:22	15-Mar-2021 13:02	15-Mar-2021 13:04
Compound	CAS Number	LOR	Unit	EP2102758-002	EP2102758-003	EP2102758-006	EP2102758-007	EP2102758-008
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.71	7.72	7.47	7.86	7.76
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	42600	42600	44300	43300	43000
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	79	52	479	90	63
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	102	112	296	119	114
Total Alkalinity as CaCO3	----	1	mg/L	102	112	296	119	114
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2860	2810	2890	2860	2820
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18800	20500	21000	21100	18800
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	481	421	476	452	499
Magnesium	7439-95-4	1	mg/L	1540	1310	1350	1360	1590
Sodium	7440-23-5	1	mg/L	12400	11800	12100	12300	12600
Potassium	7440-09-7	1	mg/L	645	686	688	702	668
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	592	639	658	657	591
ø Total Cations	----	0.01	meq/L	707	660	679	687	721
ø Ionic Balance	----	0.01	%	8.83	1.59	1.52	2.26	9.88
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	6	4	15	7	8
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW368_210315	0089_QC102_210315	0089_PW367_210315	0089_PW374_210315	0089_QC106_210315
				Sampling date / time	15-Mar-2021 10:47	15-Mar-2021 10:52	15-Mar-2021 11:22	15-Mar-2021 13:02	15-Mar-2021 13:04
Compound	CAS Number	LOR	Unit		EP2102758-002	EP2102758-003	EP2102758-006	EP2102758-007	EP2102758-008
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.04**	**0.03**	**0.01**	**0.04**	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	**0.03**	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW368_210315	0089_QC102_210315	0089_PW367_210315	0089_PW374_210315	0089_QC106_210315
				Sampling date / time	15-Mar-2021 10:47	15-Mar-2021 10:52	15-Mar-2021 11:22	15-Mar-2021 13:02	15-Mar-2021 13:04
					EP2102758-002	EP2102758-003	EP2102758-006	EP2102758-007	EP2102758-008
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.04**	**0.03**	**0.04**	**0.04**	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.04**	**0.03**	**0.01**	**0.04**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.04**	**0.03**	**0.01**	**0.04**	**0.02**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**102**	**95.6**	**94.1**	**105**
13C8-PFOA	----	0.02	%		**86.3**	**90.7**	**89.6**	**90.7**	**83.1**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW375_210315	0089_PW362_210315	----	----	----
			Sampling date / time	15-Mar-2021 13:26	15-Mar-2021 14:35	----	----	----
Compound	CAS Number	LOR	Unit	EP2102758-011	EP2102758-015	--------	--------	--------
				Result	Result	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.98	7.77	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	42700	43800	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	66	406	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	116	118	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	116	118	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2800	2960	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20600	19500	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	435	512	----	----	----
Magnesium	7439-95-4	1	mg/L	1340	1650	----	----	----
Sodium	7440-23-5	1	mg/L	12000	13100	----	----	----
Potassium	7440-09-7	1	mg/L	692	688	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	642	614	----	----	----
ø Total Cations	----	0.01	meq/L	672	749	----	----	----
ø Ionic Balance	----	0.01	%	2.28	9.88	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	4	7	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW375_210315	0089_PW362_210315	----	----	----
				Sampling date / time	15-Mar-2021 13:26	15-Mar-2021 14:35	----	----	----
Compound	CAS Number	LOR	Unit		EP2102758-011	EP2102758-015	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.03**	**0.23**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW375_210315	0089_PW362_210315	----	----	----
				Sampling date / time	15-Mar-2021 13:26	15-Mar-2021 14:35	----	----	----
Compound	CAS Number	LOR	Unit		EP2102758-011	EP2102758-015	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.03**	**0.23**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.03**	**0.23**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.03**	**0.23**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	**107**	----	----	----
13C8-PFOA	----	0.02	%		**82.4**	**84.8**	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW305_210315	0089_SW371_210315	0089_QC103_210315	0089_SW319_210315	0089_QC107_210315
				Sampling date / time	15-Mar-2021 10:36	15-Mar-2021 11:09	15-Mar-2021 11:11	15-Mar-2021 13:16	15-Mar-2021 13:18
Compound	CAS Number	LOR	Unit		EP2102758-001	EP2102758-004	EP2102758-005	EP2102758-009	EP2102758-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.95	7.95	7.98	8.23	8.22
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		42100	42700	42800	42900	42200
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		40	53	48	<5	11
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		110	186	119	111	113
Total Alkalinity as CaCO3	----	1	mg/L		110	186	119	111	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2780	2820	2790	2800	2820
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		18600	20600	20500	20600	18500
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		496	409	390	432	488
Magnesium	7439-95-4	1	mg/L		1570	1320	1270	1300	1550
Sodium	7440-23-5	1	mg/L		12500	11700	11300	11800	12400
Potassium	7440-09-7	1	mg/L		658	657	658	677	649
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		585	644	639	642	583
ø Total Cations	----	0.01	meq/L		714	655	632	659	708
ø Ionic Balance	----	0.01	%		9.99	0.86	0.50	1.35	9.69
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		3	3	3	2	3
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.03	0.02	0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW305_210315	0089_SW371_210315	0089_QC103_210315	0089_SW319_210315	0089_QC107_210315
				Sampling date / time	15-Mar-2021 10:36	15-Mar-2021 11:09	15-Mar-2021 11:11	15-Mar-2021 13:16	15-Mar-2021 13:18
Compound	CAS Number	LOR	Unit		EP2102758-001	EP2102758-004	EP2102758-005	EP2102758-009	EP2102758-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.37**	**0.22**	**0.24**	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SW305_210315	0089_SW371_210315	0089_QC103_210315	0089_SW319_210315	0089_QC107_210315
				Sampling date / time	15-Mar-2021 10:36	15-Mar-2021 11:09	15-Mar-2021 11:11	15-Mar-2021 13:16	15-Mar-2021 13:18
					EP2102758-001	EP2102758-004	EP2102758-005	EP2102758-009	EP2102758-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.40**	**0.24**	**0.26**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.40**	**0.24**	**0.26**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.40**	**0.24**	**0.26**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**93.4**	**104**	**120**	**103**
13C8-PFOA	----	0.02	%		**87.7**	**91.0**	**85.4**	**86.5**	**81.4**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW318_210315	0089_PW378_210315	0089_SW317_210315	----	----
			Sampling date / time	15-Mar-2021 13:30	15-Mar-2021 13:44	15-Mar-2021 13:49	----	----
Compound	CAS Number	LOR	Unit	EP2102758-012	EP2102758-013	EP2102758-014	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.25	7.78	8.21	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	42100	43500	41400	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	134	<5	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	111	102	111	----	----
Total Alkalinity as CaCO3	----	1	mg/L	111	102	111	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2870	2810	2790	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18700	20500	20400	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	485	432	404	----	----
Magnesium	7439-95-4	1	mg/L	1560	1320	1270	----	----
Sodium	7440-23-5	1	mg/L	12400	11800	11400	----	----
Potassium	7440-09-7	1	mg/L	653	675	648	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	589	639	636	----	----
ø Total Cations	----	0.01	meq/L	709	661	637	----	----
ø Ionic Balance	----	0.01	%	9.18	1.68	0.11	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	1	4	3	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW318_210315	0089_PW378_210315	0089_SW317_210315	----	----
				Sampling date / time	15-Mar-2021 13:30	15-Mar-2021 13:44	15-Mar-2021 13:49	----	----
Compound	CAS Number	LOR	Unit		EP2102758-012	EP2102758-013	EP2102758-014	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.02**	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW318_210315	0089_PW378_210315	0089_SW317_210315	----	----
				Sampling date / time	15-Mar-2021 13:30	15-Mar-2021 13:44	15-Mar-2021 13:49	----	----
Compound	CAS Number	LOR	Unit		EP2102758-012	EP2102758-013	EP2102758-014	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.02**	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.02**	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.02**	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**110**	**98.4**	**114**	----	----
13C8-PFOA	----	0.02	%		**84.9**	**83.5**	**84.2**	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102758**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20264	Issue Date	: 24-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 15		
No. of samples analysed	: 15		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3571640)									
EP2102755-004	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.19	8.23	0.487	0% - 20%
EP2102758-003	0089_QC102_210315	EA005-P: pH Value	----	0.01	pH Unit	7.72	7.72	0.00	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3571642)									
EP2102758-013	0089_PW378_210315	EA005-P: pH Value	----	0.01	pH Unit	7.78	7.84	0.768	0% - 20%
EP2102809-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.15	8.11	0.492	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3577272)									
EP2102755-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	188	187	0.00	0% - 50%
EP2102758-001	0089_SW305_210315	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	42100	42500	0.827	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3577277)									
EP2102758-012	0089_SW318_210315	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	42100	42400	0.686	0% - 20%
EP2102806-005	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	470	475	1.06	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3577273)									
EP2102755-004	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	52	52	1.92	0% - 50%
EP2102758-003	0089_QC102_210315	EA025H: Suspended Solids (SS)	----	5	mg/L	52	47	10.6	0% - 50%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3577278)									
EP2102758-012	0089_SW318_210315	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EP2102842-008	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3571639)									
EP2102755-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	136	137	1.06	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	136	137	1.06	0% - 20%
EP2102758-003	0089_QC102_210315	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3571639) - continued									
EP2102758-003	0089_QC102_210315	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	112	109	2.08	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	112	109	2.08	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3571641)									
EP2102758-013	0089_PW378_210315	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	102	112	8.92	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	102	112	8.92	0% - 20%
EP2102809-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	340	342	0.419	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	340	342	0.419	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3567235)									
EP2102756-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2740	2720	0.512	0% - 20%
EP2102758-006	0089_PW367_210315	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2890	2840	1.81	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3567236)									
EP2102756-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18900	18700	1.16	0% - 20%
EP2102758-006	0089_PW367_210315	ED045G: Chloride	16887-00-6	1	mg/L	21000	21200	0.717	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3568776)									
EP2102756-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	491	498	1.44	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1570	1590	1.11	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12500	12700	1.63	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	658	668	1.43	0% - 20%
EP2102758-010	0089_QC107_210315	ED093F: Calcium	7440-70-2	1	mg/L	488	509	4.36	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1550	1620	4.37	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12400	13000	4.50	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	649	681	4.80	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3572707)									
EP2102755-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	10	9	0.00	No Limit
EP2102756-005	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	11	11	0.00	0% - 50%
EP005: Total Organic Carbon (TOC) (QC Lot: 3575123)									
EP2102758-010	0089_QC107_210315	EP005: Total Organic Carbon	----	1	mg/L	3	3	0.00	No Limit
EP2102833-005	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	14	15	11.9	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3571640)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3571642)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3577272)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114
				<10	1000 mg/L	95.4	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3577277)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114
				<10	1000 mg/L	106	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3577273)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.7	89.1	120
				<5	1000 mg/L	94.9	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3577278)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	93.0	89.1	120
				<5	1000 mg/L	97.0	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3571639)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	88.2	81.2	126
				<1	200 mg/L	90.8	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3571641)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	105	81.2	126
				<1	200 mg/L	93.2	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3567235)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	87.7	113
				<1	500 mg/L	105	87.7	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 3567236)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	87.9	114
				<1	1000 mg/L	93.2	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3568776)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.2	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.1	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.0	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3572707)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	111	87.2	116
				<1	100 mg/L	109	87.2	116
EP005: Total Organic Carbon (TOC) (QCLot: 3575123)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	111	87.2	116
				<1	100 mg/L	108	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3570717)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	97.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	96.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	111	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3570717)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	102	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	125	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	117	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	96.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	92.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	92.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3570717)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	108	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	74.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	82.0	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	91.3	66.0	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3570717) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	112	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	116	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3570717)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	104	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	118	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	120	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	120	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3567235)							
EP2102756-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3567236)							
EP2102756-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3572707)							
EP2102755-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	109	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3575123)							
EP2102758-011	0089_PW375_210315	EP005: Total Organic Carbon	----	100 mg/L	108	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102758**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 15-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 24-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 15
Order number	: DEF19009/730	No. of samples analysed	: 15

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102756--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102756--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_SW305_210315,	0089_PW368_210315,	----	----	----	18-Mar-2021	15-Mar-2021	**3**
0089_QC102_210315,	0089_SW371_210315,						
0089_QC103_210315,	0089_PW367_210315,						
0089_PW374_210315,	0089_QC106_210315,						
0089_SW319_210315,	0089_QC107_210315,						
0089_PW375_210315,	0089_SW318_210315,						
0089_PW378_210315,	0089_SW317_210315,						
0089_PW362_210315							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_SW305_210315, 0089_PW368_210315, 0089_QC102_210315, 0089_SW371_210315, 0089_QC103_210315, 0089_PW367_210315, 0089_PW374_210315, 0089_QC106_210315, 0089_SW319_210315, 0089_QC107_210315, 0089_PW375_210315, 0089_SW318_210315, 0089_PW378_210315, 0089_SW317_210315, 0089_PW362_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	15-Mar-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_SW305_210315, 0089_PW368_210315, 0089_QC102_210315, 0089_SW371_210315, 0089_QC103_210315, 0089_PW367_210315, 0089_PW374_210315, 0089_QC106_210315, 0089_SW319_210315, 0089_QC107_210315, 0089_PW375_210315, 0089_SW318_210315, 0089_PW378_210315, 0089_SW317_210315, 0089_PW362_210315	**15-Mar-2021**	**----**	----	----	**22-Mar-2021**	22-Mar-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW305_210315, 0089_PW368_210315, 0089_QC102_210315, 0089_SW371_210315, 0089_QC103_210315, 0089_PW367_210315, 0089_PW374_210315, 0089_QC106_210315, 0089_SW319_210315, 0089_QC107_210315, 0089_PW375_210315, 0089_SW318_210315, 0089_PW378_210315, 0089_SW317_210315, 0089_PW362_210315	**15-Mar-2021**	**----**	----	----	**22-Mar-2021**	22-Mar-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW305_210315, 0089_PW368_210315, 0089_QC102_210315, 0089_SW371_210315, 0089_QC103_210315, 0089_PW367_210315, 0089_PW374_210315, 0089_QC106_210315, 0089_SW319_210315, 0089_QC107_210315, 0089_PW375_210315, 0089_SW318_210315, 0089_PW378_210315, 0089_SW317_210315, 0089_PW362_210315	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	29-Mar-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW305_210315, 0089_QC102_210315, 0089_QC103_210315, 0089_PW374_210315, 0089_SW319_210315, 0089_PW375_210315, 0089_PW378_210315, 0089_PW362_210315, 0089_PW368_210315, 0089_SW371_210315, 0089_PW367_210315, 0089_QC106_210315, 0089_QC107_210315, 0089_SW318_210315, 0089_SW317_210315,	**15-Mar-2021**	**----**	----	----	**23-Mar-2021**	12-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW305_210315, 0089_QC102_210315, 0089_QC103_210315, 0089_PW374_210315, 0089_SW319_210315, 0089_PW375_210315, 0089_PW378_210315, 0089_PW362_210315, 0089_PW368_210315, 0089_SW371_210315, 0089_PW367_210315, 0089_QC106_210315, 0089_QC107_210315, 0089_SW318_210315, 0089_SW317_210315,	**15-Mar-2021**	**----**	----	----	**23-Mar-2021**	12-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW305_210315, 0089_QC102_210315, 0089_QC103_210315, 0089_PW374_210315, 0089_SW319_210315, 0089_PW375_210315, 0089_PW378_210315, 0089_PW362_210315, 0089_PW368_210315, 0089_SW371_210315, 0089_PW367_210315, 0089_QC106_210315, 0089_QC107_210315, 0089_SW318_210315, 0089_SW317_210315,	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	22-Mar-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW305_210315, 0089_QC102_210315, 0089_QC103_210315, 0089_PW374_210315, 0089_SW319_210315, 0089_PW368_210315, 0089_SW371_210315, 0089_PW367_210315, 0089_QC106_210315,	**15-Mar-2021**	**----**	----	----	**18-Mar-2021**	12-Apr-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_QC107_210315, 0089_SW318_210315, 0089_SW317_210315, 0089_PW375_210315, 0089_PW378_210315, 0089_PW362_210315	**15-Mar-2021**	**----**	----	----	**19-Mar-2021**	12-Apr-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW305_210315, 0089_PW368_210315, 0089_QC102_210315, 0089_SW371_210315, 0089_QC103_210315, 0089_PW367_210315, 0089_PW374_210315, 0089_QC106_210315, 0089_SW319_210315, 0089_QC107_210315, 0089_PW375_210315, 0089_SW318_210315, 0089_PW378_210315, 0089_SW317_210315, 0089_PW362_210315	**15-Mar-2021**	**19-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW305_210315, 0089_PW368_210315, 0089_QC102_210315, 0089_SW371_210315, 0089_QC103_210315, 0089_PW367_210315, 0089_PW374_210315, 0089_QC106_210315, 0089_SW319_210315, 0089_QC107_210315, 0089_PW375_210315, 0089_SW318_210315, 0089_PW378_210315, 0089_SW317_210315, 0089_PW362_210315	**15-Mar-2021**	**19-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW305_210315, 0089_PW368_210315, 0089_QC102_210315, 0089_SW371_210315, 0089_QC103_210315, 0089_PW367_210315, 0089_PW374_210315, 0089_QC106_210315, 0089_SW319_210315, 0089_QC107_210315, 0089_PW375_210315, 0089_SW318_210315, 0089_PW378_210315, 0089_SW317_210315, 0089_PW362_210315	**15-Mar-2021**	**19-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW305_210315, 0089_PW368_210315, 0089_QC102_210315, 0089_SW371_210315, 0089_QC103_210315, 0089_PW367_210315, 0089_PW374_210315, 0089_QC106_210315, 0089_SW319_210315, 0089_QC107_210315, 0089_PW375_210315, 0089_SW318_210315, 0089_PW378_210315, 0089_SW317_210315, 0089_PW362_210315	**15-Mar-2021**	**19-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW305_210315, 0089_QC102_210315, 0089_QC103_210315, 0089_PW374_210315, 0089_SW319_210315, 0089_PW375_210315, 0089_PW378_210315, 0089_PW362_210315, 0089_PW368_210315, 0089_SW371_210315, 0089_PW367_210315, 0089_QC106_210315, 0089_QC107_210315, 0089_SW318_210315, 0089_SW317_210315,	**15-Mar-2021**	**19-Mar-2021**	11-Sep-2021	✓	**19-Mar-2021**	11-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	20	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	31	**12.90**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	31	**12.90**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	20	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102758**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20264	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 15-Mar-2021 16:20	Issue Date	: 16-Mar-2021
Client Requested Due Date	: 24-Mar-2021	Scheduled Reporting Date	: **24-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 15 / 15

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102758-001	15-Mar-2021 10:36	0089_SW305_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-002	15-Mar-2021 10:47	0089_PW368_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-003	15-Mar-2021 10:52	0089_QC102_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-004	15-Mar-2021 11:09	0089_SW371_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-005	15-Mar-2021 11:11	0089_QC103_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-006	15-Mar-2021 11:22	0089_PW367_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-007	15-Mar-2021 13:02	0089_PW374_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-008	15-Mar-2021 13:04	0089_QC106_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-009	15-Mar-2021 13:16	0089_SW319_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-010	15-Mar-2021 13:18	0089_QC107_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-011	15-Mar-2021 13:26	0089_PW375_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-012	15-Mar-2021 13:30	0089_SW318_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-013	15-Mar-2021 13:44	0089_PW378_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-014	15-Mar-2021 13:49	0089_SW317_210315	✓	✓	✓	✓	✓	✓	✓
EP2102758-015	15-Mar-2021 14:35	0089_PW362_210315	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102758-001	15-Mar-2021 10:36	0089_SW305_210315	✓
EP2102758-002	15-Mar-2021 10:47	0089_PW368_210315	✓
EP2102758-003	15-Mar-2021 10:52	0089_QC102_210315	✓
EP2102758-004	15-Mar-2021 11:09	0089_SW371_210315	✓
EP2102758-005	15-Mar-2021 11:11	0089_QC103_210315	✓
EP2102758-006	15-Mar-2021 11:22	0089_PW367_210315	✓
EP2102758-007	15-Mar-2021 13:02	0089_PW374_210315	✓
EP2102758-008	15-Mar-2021 13:04	0089_QC106_210315	✓
EP2102758-009	15-Mar-2021 13:16	0089_SW319_210315	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102758-010	15-Mar-2021 13:18	0089_QC107_210315	✓
EP2102758-011	15-Mar-2021 13:26	0089_PW375_210315	✓
EP2102758-012	15-Mar-2021 13:30	0089_SW318_210315	✓
EP2102758-013	15-Mar-2021 13:44	0089_PW378_210315	✓
EP2102758-014	15-Mar-2021 13:49	0089_SW317_210315	✓
EP2102758-015	15-Mar-2021 14:35	0089_PW362_210315	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 20264 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO [redacted]

EMAIL INVOICES TO

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 15/3/21 1620	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW305		15/03/2021 10:36 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW368		15/03/2021 10:47 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_QC102		15/03/2021 10:52 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_SW371		15/03/2021 11:09 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_QC103		15/03/2021 11:11 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_PW367		15/03/2021 11:22 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_PW374		15/03/2021 01:02 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_QC106		15/03/2021 01:04 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_SW319		15/03/2021 01:16 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2102758

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: **20264** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_QC107		15/03/2021 01:18 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
011	0089_PW375		15/03/2021 01:26 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
012	0089_SW318		15/03/2021 01:30 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
013	0089_PW378		15/03/2021 01:44 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
014	0089_SW317		15/03/2021 01:49 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
015	0089_PW362	plus toc vial	15/03/2021 02:35 PM	Water	ALS: 5 Non ALS: 1	No	Partial 7/8	X		

CHAIN OF CUSTODY

ALS COC#: 20264 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW305	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW368	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_QC102	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW371	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_QC103	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **20264** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW367	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW374	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_QC106	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_SW319	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_QC107	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_PW375	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 20264 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

012	0089_SW318	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
013	0089_PW378	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
014	0089_SW317	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
015	0089_PW362	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 20264 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW305	HDPE (no PTFE)	20 mL	00352010071567	Grey	No	
001	0089_SW305	HDPE (no PTFE)	20 mL	00352010071164	Grey	No	
001	0089_SW305	Clear Plastic Bottle - Natural	250 mL	00070719175494	Green	No	
001	0089_SW305	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001780	Purple	No	
002	0089_PW368	Clear Plastic Bottle - Natural	250 mL	00070719175577	Green	No	
002	0089_PW368	HDPE (no PTFE)	20 mL	00352010071683	Grey	No	
002	0089_PW368	HDPE (no PTFE)	20 mL	00352010071679	Grey	No	
002	0089_PW368	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001796	Purple	No	
003	0089_QC102	Clear Plastic Bottle - Natural	250 mL	00070719175552	Green	No	
003	0089_QC102	HDPE (no PTFE)	20 mL	00352010071237	Grey	No	
003	0089_QC102	HDPE (no PTFE)	20 mL	00352010071200	Grey	No	
003	0089_QC102	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001826	Purple	No	
004	0089_SW371	Clear Plastic Bottle - Natural	250 mL	00070719175505	Green	No	
004	0089_SW371	HDPE (no PTFE)	20 mL	00352010071300	Grey	No	
004	0089_SW371	HDPE (no PTFE)	20 mL	00352010071161	Grey	No	
004	0089_SW371	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001760	Purple	No	
005	0089_QC103	Clear Plastic Bottle - Natural	250 mL	00070719175491	Green	No	
005	0089_QC103	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001816	Purple	No	
005	0089_QC103	HDPE (no PTFE)	20 mL	00352010071316	Grey	No	
005	0089_QC103	HDPE (no PTFE)	20 mL	00352010071273	Grey	No	
006	0089_PW367	HDPE (no PTFE)	20 mL	00352010071406	Grey	No	
006	0089_PW367	HDPE (no PTFE)	20 mL	00352010071674	Grey	No	
006	0089_PW367	Clear Plastic Bottle - Natural	250 mL	00070719175482	Green	No	
006	0089_PW367	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001461	Purple	No	
007	0089_PW374	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049478	Purple	No	
007	0089_PW374	HDPE (no PTFE)	20 mL	00352010071267	Grey	No	

CHAIN OF CUSTODY

ALS COC#: **20264** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_PW374	HDPE (no PTFE)	20 mL	00352010071662	Grey	No	
007	0089_PW374	Clear Plastic Bottle - Natural	250 mL	00070719175517	Green	No	
008	0089_QC106	Clear Plastic Bottle - Natural	250 mL	00070719175558	Green	No	
008	0089_QC106	HDPE (no PTFE)	20 mL	00352010071185	Grey	No	
008	0089_QC106	HDPE (no PTFE)	20 mL	00352010071149	Grey	No	
008	0089_QC106	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049530	Purple	No	
009	0089_SW319	Clear Plastic Bottle - Natural	250 mL	00070719175493	Green	No	
009	0089_SW319	HDPE (no PTFE)	20 mL	00352010071502	Grey	No	
009	0089_SW319	HDPE (no PTFE)	20 mL	00352010071208	Grey	No	
009	0089_SW319	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049517	Purple	No	
010	0089_QC107	Clear Plastic Bottle - Natural	250 mL	00070719175627	Green	No	
010	0089_QC107	HDPE (no PTFE)	20 mL	00352010071220	Grey	No	
010	0089_QC107	HDPE (no PTFE)	20 mL	00352010071104	Grey	No	
010	0089_QC107	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049506	Purple	No	
011	0089_PW375	HDPE (no PTFE)	20 mL	00352010071427	Grey	No	
011	0089_PW375	HDPE (no PTFE)	20 mL	00352010071421	Grey	No	
011	0089_PW375	Clear Plastic Bottle - Natural	250 mL	00070719175444	Green	No	
011	0089_PW375	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001409	Purple	No	
012	0089_SW318	Clear Plastic Bottle - Natural	250 mL	00070719175498	Green	No	
012	0089_SW318	HDPE (no PTFE)	20 mL	00352010071221	Grey	No	
012	0089_SW318	HDPE (no PTFE)	20 mL	00352010071284	Grey	No	
012	0089_SW318	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001757	Purple	No	
013	0089_PW378	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001253	Purple	No	
013	0089_PW378	Clear Plastic Bottle - Natural	250 mL	00070719175485	Green	No	
013	0089_PW378	HDPE (no PTFE)	20 mL	00352010071608	Grey	No	
013	0089_PW378	HDPE (no PTFE)	20 mL	00352010071365	Grey	No	
014	0089_SW317	HDPE (no PTFE)	20 mL	00352010071102	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: **20264** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

014	0089_SW317	HDPE (no PTFE)	20 mL	00352010071134	Grey	No	
014	0089_SW317	Clear Plastic Bottle - Natural	250 mL	00070719175472	Green	No	
014	0089_SW317	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001850	Purple	No	
015	0089_PW362	HDPE (no PTFE)	20 mL	00352010071383	Grey	No	
015	0089_PW362	HDPE (no PTFE)	20 mL	00352010071378	Grey	No	
015	0089_PW362	HDPE (no PTFE)	20 mL	00352010080521	Grey	No	
015	0089_PW362	HDPE (no PTFE)	20 mL	00352010080799	Grey	No	
015	0089_PW362	Clear Plastic Bottle - Natural	250 mL	00070719175486	Green	No	

Total Bottle Count: ALS: 61, Non ALS: 1

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102833**	Page	: 1 of 17
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021 08:00
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20307	Issue Date	: 26-Mar-2021 17:39
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 24		
No. of samples analysed	: 24		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231X: PFAS results for sample #17 confirmed by re-extraction and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW117_210316	0089_QC109_210316	0089_MW112_210316	0089_QC112_210316	0089_MW109_210316
			Sampling date / time	16-Mar-2021 09:24	16-Mar-2021 09:24	16-Mar-2021 09:52	16-Mar-2021 09:52	16-Mar-2021 10:08
Compound	CAS Number	LOR	Unit	EP2102833-001	EP2102833-002	EP2102833-003	EP2102833-004	EP2102833-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.60	7.62	7.89	7.95	7.98
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	604	604	396	378	835
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	1250	878	406	283	26
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	401	478	211	213	434
Total Alkalinity as CaCO3	----	1	mg/L	401	478	211	213	434
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	33	35	35	32	26
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	36	36	38	37	227
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	149	145	88	87	121
Magnesium	7439-95-4	1	mg/L	18	18	12	12	45
Sodium	7440-23-5	1	mg/L	24	23	25	24	123
Potassium	7440-09-7	1	mg/L	3	3	3	2	2
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	9.71	11.3	6.02	5.96	15.6
ø Total Cations	----	0.01	meq/L	10.0	9.79	6.54	6.42	15.1
ø Ionic Balance	----	0.01	%	1.63	7.12	4.19	3.70	1.54
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	15	18	2	4	14
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.57	0.56	0.17	0.13	0.34
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	1.35	1.30	1.52	1.00	0.58
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	13.0	13.2	36.6	23.4	3.64
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	2.18	2.08	5.00	3.07	0.22

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW117_210316	0089_QC109_210316	0089_MW112_210316	0089_QC112_210316	0089_MW109_210316
				Sampling date / time	16-Mar-2021 09:24	16-Mar-2021 09:24	16-Mar-2021 09:52	16-Mar-2021 09:52	16-Mar-2021 10:08
Compound	CAS Number	LOR	Unit		EP2102833-001	EP2102833-002	EP2102833-003	EP2102833-004	EP2102833-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**25.0**	**27.3**	**14.4**	**16.0**	**3.72**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.2**	**0.2**	**0.2**	**0.1**	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.66**	**0.67**	**0.56**	**0.43**	**0.10**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**3.62**	**3.83**	**3.59**	**2.43**	**0.62**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.36**	**0.38**	**0.64**	**0.49**	**0.06**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**1.11**	**1.17**	**4.28**	**3.39**	**0.18**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	**0.14**	**0.21**	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW117_210316	0089_QC109_210316	0089_MW112_210316	0089_QC112_210316	0089_MW109_210316
				Sampling date / time	16-Mar-2021 09:24	16-Mar-2021 09:24	16-Mar-2021 09:52	16-Mar-2021 09:52	16-Mar-2021 10:08
Compound	CAS Number	LOR	Unit		EP2102833-001	EP2102833-002	EP2102833-003	EP2102833-004	EP2102833-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	**0.15**	**0.12**	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**48.0**	**50.7**	**67.2**	**50.8**	**9.46**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**38.0**	**40.5**	**51.0**	**39.4**	**7.36**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**44.5**	**47.3**	**60.6**	**46.5**	**8.66**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**95.8**	**74.1**	**92.0**	**90.8**	**72.9**
13C8-PFOA	----	0.02	%		**110**	**110**	**104**	**100**	**82.6**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW200_210316	0089_MW197_210316	0089_MW173_210316	0089_QC114_210316	0089_MW195D_210316
				Sampling date / time	16-Mar-2021 11:00	16-Mar-2021 11:23	16-Mar-2021 12:12	16-Mar-2021 12:12	16-Mar-2021 12:44
Compound	CAS Number	LOR	Unit		EP2102833-006	EP2102833-007	EP2102833-008	EP2102833-009	EP2102833-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.91	7.91	7.78	7.80	7.59
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		5690	3810	2210	2210	26400
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		37	821	98	70	448
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		421	454	583	538	146
Total Alkalinity as CaCO3	----	1	mg/L		421	454	583	538	146
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		299	182	264	263	1670
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		2780	1760	824	830	13500
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		123	90	83	86	461
Magnesium	7439-95-4	1	mg/L		160	184	104	106	1000
Sodium	7440-23-5	1	mg/L		1720	1010	565	567	7390
Potassium	7440-09-7	1	mg/L		98	59	45	44	383
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		93.0	62.5	40.4	39.6	418
ø Total Cations	----	0.01	meq/L		96.6	65.1	38.4	38.8	436
ø Ionic Balance	----	0.01	%		1.88	2.01	2.49	1.06	2.11
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		8	20	29	19	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	0.30	0.27	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	0.32	0.33	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	4.02	4.49	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	0.74	0.76	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW200_210316	0089_MW197_210316	0089_MW173_210316	0089_QC114_210316	0089_MW195D_210316
				Sampling date / time	16-Mar-2021 11:00	16-Mar-2021 11:23	16-Mar-2021 12:12	16-Mar-2021 12:12	16-Mar-2021 12:44
Compound	CAS Number	LOR	Unit		EP2102833-006	EP2102833-007	EP2102833-008	EP2102833-009	EP2102833-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**3.97**	**4.45**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	**0.27**	**0.27**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.69**	**0.68**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**0.18**	**0.18**	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.63**	**0.63**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW200_210316	0089_MW197_210316	0089_MW173_210316	0089_QC114_210316	0089_MW195D_210316
				Sampling date / time	16-Mar-2021 11:00	16-Mar-2021 11:23	16-Mar-2021 12:12	16-Mar-2021 12:12	16-Mar-2021 12:44
					EP2102833-006	EP2102833-007	EP2102833-008	EP2102833-009	EP2102833-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	**0.13**	**0.12**	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**11.2**	**12.2**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**7.99**	**8.94**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**10.2**	**11.1**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**85.9**	**86.6**	**107**	**92.6**	**91.5**
13C8-PFOA	----	0.02	%		**90.0**	**93.8**	**107**	**100**	**93.8**

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC301_210316	0089_QC302_210316	0089_QC303_210316	0089_QC401_210316	0089_QC402_210316
				Sampling date / time	16-Mar-2021 07:58	16-Mar-2021 07:59	16-Mar-2021 08:00	16-Mar-2021 08:00	16-Mar-2021 08:01
					EP2102833-011	EP2102833-012	EP2102833-013	EP2102833-014	EP2102833-015
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC301_210316	0089_QC302_210316	0089_QC303_210316	0089_QC401_210316	0089_QC402_210316
				Sampling date / time	16-Mar-2021 07:58	16-Mar-2021 07:59	16-Mar-2021 08:00	16-Mar-2021 08:00	16-Mar-2021 08:01
					EP2102833-011	EP2102833-012	EP2102833-013	EP2102833-014	EP2102833-015
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**91.0**	**90.5**	**98.0**	**97.8**
13C8-PFOA	----	0.02	%		**90.4**	**89.2**	**85.6**	**93.3**	**90.4**

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC403_210316	0089_QC114_210316	0089_MW236_210316	0089_MW195S_210316	0089_MW193_210316
				Sampling date / time	16-Mar-2021 08:01	16-Mar-2021 12:45	16-Mar-2021 13:52	16-Mar-2021 14:11	16-Mar-2021 14:14
					EP2102833-016	EP2102833-017	EP2102833-018	EP2102833-019	EP2102833-020
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		----	7.90	7.95	7.82	7.72
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		----	15500	425	3060	2120
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		----	62	94	199	68
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	242	238	557	629
Total Alkalinity as CaCO3	----	1	mg/L		----	242	238	557	629
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	1020	19	328	111
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	7980	40	1160	852
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	310	95	186	116
Magnesium	7439-95-4	1	mg/L		----	574	17	155	118
Sodium	7440-23-5	1	mg/L		----	4000	22	650	487
Potassium	7440-09-7	1	mg/L		----	208	2	53	33
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		----	251	6.28	50.7	38.9
ø Total Cations	----	0.01	meq/L		----	242	7.15	51.7	37.5
ø Ionic Balance	----	0.01	%		----	1.86	6.47	0.96	1.81
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		----	5	6	16	16
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.02	0.45	<0.02	1.22
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	1.28	<0.02	1.29
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	17.8	<0.02	10.0
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	0.66	<0.02	0.70

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC403_210316	0089_QC114_210316	0089_MW236_210316	0089_MW195S_210316	0089_MW193_210316
				Sampling date / time	16-Mar-2021 08:01	16-Mar-2021 12:45	16-Mar-2021 13:52	16-Mar-2021 14:11	16-Mar-2021 14:14
Compound	CAS Number	LOR	Unit		EP2102833-016	EP2102833-017	EP2102833-018	EP2102833-019	EP2102833-020
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.01**	**53.4**	<0.01	**2.08**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	**0.1**	<0.1	**0.3**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.26**	**0.25**	<0.02	**0.52**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.18**	**1.72**	<0.02	**2.44**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.14**	**0.50**	<0.02	**0.24**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**1.24**	<0.01	**0.62**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	**3.15**	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC403_210316	0089_QC114_210316	0089_MW236_210316	0089_MW195S_210316	0089_MW193_210316
				Sampling date / time	16-Mar-2021 08:01	16-Mar-2021 12:45	16-Mar-2021 13:52	16-Mar-2021 14:11	16-Mar-2021 14:14
					EP2102833-016	EP2102833-017	EP2102833-018	EP2102833-019	EP2102833-020
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	**0.36**	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.97**	**80.6**	<0.01	**19.4**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.01**	**71.2**	<0.01	**12.1**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.97**	**75.5**	<0.01	**17.4**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.7**	**95.6**	**97.5**	**97.4**	**89.8**
13C8-PFOA	----	0.02	%		**91.2**	**87.8**	**91.2**	**87.5**	**87.0**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW120_210316	0089_MW121_210316	0089_QC108_210316	0089_MW123_210316	----
			Sampling date / time	16-Mar-2021 14:16	16-Mar-2021 14:18	16-Mar-2021 14:21	16-Mar-2021 14:24	----
Compound	CAS Number	LOR	Unit	EP2102833-021	EP2102833-022	EP2102833-023	EP2102833-024	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.04	8.00	7.87	7.93	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	464	544	356	319	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	1410	7700	680	179	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	236	211	218	191	----
Total Alkalinity as CaCO3	----	1	mg/L	236	211	218	191	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	21	19	8	7	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	38	40	48	47	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	78	84	74	74	----
Magnesium	7439-95-4	1	mg/L	17	15	10	10	----
Sodium	7440-23-5	1	mg/L	30	28	27	26	----
Potassium	7440-09-7	1	mg/L	3	4	3	3	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	6.22	5.74	5.88	5.29	----
ø Total Cations	----	0.01	meq/L	6.67	6.75	5.77	5.72	----
ø Ionic Balance	----	0.01	%	3.48	8.06	0.94	3.96	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	13	25	6	6	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.64	0.11	0.11	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	1.53	0.09	0.08	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	3.33	17.7	0.49	0.48	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.46	2.35	<0.02	<0.02	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW120_210316	0089_MW121_210316	0089_QC108_210316	0089_MW123_210316	----
				Sampling date / time	16-Mar-2021 14:16	16-Mar-2021 14:18	16-Mar-2021 14:21	16-Mar-2021 14:24	----
Compound	CAS Number	LOR	Unit		EP2102833-021	EP2102833-022	EP2102833-023	EP2102833-024	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**3.81**	**29.3**	**0.06**	**0.05**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	**0.2**	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.03**	**0.40**	**0.13**	**0.13**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.15**	**2.16**	**0.48**	**0.47**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.31**	**0.03**	**0.03**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.20**	**1.18**	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	**0.32**	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW120_210316	0089_MW121_210316	0089_QC108_210316	0089_MW123_210316	----
				Sampling date / time	16-Mar-2021 14:16	16-Mar-2021 14:18	16-Mar-2021 14:21	16-Mar-2021 14:24	----
Compound	CAS Number	LOR	Unit		EP2102833-021	EP2102833-022	EP2102833-023	EP2102833-024	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	**0.14**	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**8.06**	**56.2**	**1.39**	**1.35**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**7.14**	**47.0**	**0.55**	**0.53**	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**7.55**	**52.0**	**1.30**	**1.27**	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**82.5**	**98.1**	**95.3**	----
13C8-PFOA	----	0.02	%		**87.8**	**90.2**	**92.5**	**91.0**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102833**	Page	: 1 of 10
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20307	Issue Date	: 26-Mar-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 24		
No. of samples analysed	: 24		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3580472)									
EP2102833-002	0089_QC109_210316	EA005-P: pH Value	----	0.01	pH Unit	7.62	7.68	0.784	0% - 20%
EP2102833-018	0089_MW236_210316	EA005-P: pH Value	----	0.01	pH Unit	7.95	7.96	0.126	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3579810)									
EP2102833-001	0089_MW117_210316	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	604	620	2.62	0% - 20%
EP2102833-009	0089_QC114_210316	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2210	2180	1.18	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3579811)									
EP2102833-001	0089_MW117_210316	EA025H: Suspended Solids (SS)	----	5	mg/L	1250	1290	3.30	0% - 20%
EP2102833-017	0089_QC114_210316	EA025H: Suspended Solids (SS)	----	5	mg/L	62	53	14.8	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3580471)									
EP2102833-002	0089_QC109_210316	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	478	410	15.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	478	410	15.3	0% - 20%
EP2102833-018	0089_MW236_210316	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	238	239	0.474	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	238	239	0.474	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3570101)									
EP2102833-001	0089_MW117_210316	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	33	33	0.00	0% - 20%
EP2102833-017	0089_QC114_210316	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1020	1010	0.762	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3570102)									
EP2102833-001	0089_MW117_210316	ED045G: Chloride	16887-00-6	1	mg/L	36	36	0.00	0% - 20%
EP2102833-017	0089_QC114_210316	ED045G: Chloride	16887-00-6	1	mg/L	7980	8030	0.585	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3568780)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3568780) - continued									
EP2102683-023	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	13	13	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	48	48	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	369	368	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	16	16	0.00	0% - 50%
EP2102833-003	0089_MW112_210316	ED093F: Calcium	7440-70-2	1	mg/L	88	90	3.33	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	12	12	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	25	26	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3568781)									
EP2102833-019	0089_MW195S_210316	ED093F: Calcium	7440-70-2	1	mg/L	186	184	0.745	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	155	154	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	650	648	0.280	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	53	53	0.00	0% - 20%
EP2102842-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	22	21	4.66	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	210	215	2.13	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3575123)									
EP2102758-010	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	3	3	0.00	No Limit
EP2102833-005	0089_MW109_210316	EP005: Total Organic Carbon	----	1	mg/L	14	15	11.9	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3575126)									
EP2102833-021	0089_MW120_210316	EP005: Total Organic Carbon	----	1	mg/L	13	16	16.5	No Limit
EP2102836-004	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	3	3	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3575991)									
EP2102833-001	0089_MW117_210316	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	25.0	25.1	0.292	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.57	0.60	5.01	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	1.35	1.30	3.65	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	13.0	13.1	1.03	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	2.18	2.06	5.53	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP2102833-006	0089_MW200_210316	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3575991)									
EP2102833-001	0089_MW117_210316	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.11	1.12	1.48	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.66	0.68	2.69	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3575991) - continued									
EP2102833-001	0089_MW117_210316	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	3.62	3.91	7.53	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.36	0.36	0.00	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.2	0.2	0.00	No Limit
EP2102833-006	0089_MW200_210316	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3575991)									
EP2102833-001	0089_MW117_210316	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP2102833-006	0089_MW200_210316	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3575991) - continued									
EP2102833-006	0089_MW200_210316	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3575991)									
EP2102833-001	0089_MW117_210316	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP2102833-006	0089_MW200_210316	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3575991)									
EP2102833-001	0089_MW117_210316	EP231X: Sum of PFAS	----	0.01	µg/L	48.0	48.4	0.788	0% - 20%
EP2102833-006	0089_MW200_210316	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3580472)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3579810)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	104	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3579811)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	109	89.1	120
				<5	1000 mg/L	105	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3580471)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	87.0	81.2	126
				<1	200 mg/L	94.1	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3570101)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	102	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3570102)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.2	87.9	114
				<1	1000 mg/L	99.5	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3568780)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.6	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.8	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.7	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3568781)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	92.8	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	93.4	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	91.3	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.1	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3575123)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	111	87.2	116
				<1	100 mg/L	108	87.2	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 3575126)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	110	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3575991)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	99.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	95.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	91.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	89.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	109	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	101	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3576736)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	117	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	110	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	117	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	110	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3575991)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	94.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	97.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	108	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	96.8	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	95.1	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3576736)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	108	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	117	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	113	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	119	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3576736) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	112	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	101	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3575991)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	99.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	92.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	93.3	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	102	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	105	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	109	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3576736)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	104	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	97.4	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	106	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	102	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	118	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	104	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3575991)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	99.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	93.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	95.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	91.6	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3576736)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	116	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	120	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	114	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	102	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3570101)							
EP2102833-001	0089_MW117_210316	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	105	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3570102)							
EP2102833-001	0089_MW117_210316	ED045G: Chloride	16887-00-6	1000 mg/L	102	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3575123)							
EP2102758-011	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	108	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3575126)							
EP2102833-022	0089_MW121_210316	EP005: Total Organic Carbon	----	100 mg/L	90.7	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3575991)							
EP2102833-005	0089_MW109_210316	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	104	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	121	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	# Not Determined	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	109	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	# Not Determined	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	87.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3575991)							
EP2102833-005	0089_MW109_210316	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	90.0	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	107	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	87.4	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	102	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	106	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	97.6	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	111	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	101	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	103	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	88.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	89.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3575991)							
EP2102833-005	0089_MW109_210316	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	97.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	92.7	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	86.2	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	84.9	66.0	145

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3575991) - continued							
EP2102833-005	0089_MW109_210316	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	98.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	103	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	90.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3575991)							
EP2102833-005	0089_MW109_210316	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	89.2	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	104	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	99.2	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	100	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102833**	Page	: 1 of 10
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 26-Mar-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 24
Order number	: DEF19009/730	No. of samples analysed	: 24

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2102833--005	0089_MW109_210316	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2102833--005	0089_MW109_210316	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW117_210316,	0089_QC109_210316,	----	----	----	23-Mar-2021	16-Mar-2021	**7**
0089_MW112_210316,	0089_QC112_210316,						
0089_MW109_210316,	0089_MW200_210316,						
0089_MW197_210316,	0089_MW173_210316,						
0089_QC114_210316,	0089_MW195D_210316,						
0089_QC114_210316,	0089_MW236_210316,						
0089_MW195S_210316,	0089_MW193_210316,						
0089_MW120_210316,	0089_MW121_210316,						
0089_QC108_210316,	0089_MW123_210316						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	38	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	38	2.63	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_MW117_210316,	0089_QC109_210316,	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	16-Mar-2021	×
0089_MW112_210316,	0089_QC112_210316,							
0089_MW109_210316,	0089_MW200_210316,							
0089_MW197_210316,	0089_MW173_210316,							
0089_QC114_210316,	0089_MW195D_210316,							
0089_QC114_210316,	0089_MW236_210316,							
0089_MW195S_210316,	0089_MW193_210316,							
0089_MW120_210316,	0089_MW121_210316,							
0089_QC108_210316,	0089_MW123_210316							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_MW117_210316,	0089_QC109_210316,	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	23-Mar-2021	✓
0089_MW112_210316,	0089_QC112_210316,							
0089_MW109_210316,	0089_MW200_210316,							
0089_MW197_210316,	0089_MW173_210316,							
0089_QC114_210316,	0089_MW195D_210316,							
0089_QC114_210316,	0089_MW236_210316,							
0089_MW195S_210316,	0089_MW193_210316,							
0089_MW120_210316,	0089_MW121_210316,							
0089_QC108_210316,	0089_MW123_210316							
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
0089_MW117_210316,	0089_QC109_210316,	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	23-Mar-2021	✓
0089_MW112_210316,	0089_QC112_210316,							
0089_MW109_210316,	0089_MW200_210316,							
0089_MW197_210316,	0089_MW173_210316,							
0089_QC114_210316,	0089_MW195D_210316,							
0089_QC114_210316,	0089_MW236_210316,							
0089_MW195S_210316,	0089_MW193_210316,							
0089_MW120_210316,	0089_MW121_210316,							
0089_QC108_210316,	0089_MW123_210316							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_MW117_210316,	0089_QC109_210316,	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	30-Mar-2021	✓
0089_MW112_210316,	0089_QC112_210316,							
0089_MW109_210316,	0089_MW200_210316,							
0089_MW197_210316,	0089_MW173_210316,							
0089_QC114_210316,	0089_MW195D_210316,							
0089_QC114_210316,	0089_MW236_210316,							
0089_MW195S_210316,	0089_MW193_210316,							
0089_MW120_210316,	0089_MW121_210316,							
0089_QC108_210316,	0089_MW123_210316							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_MW117_210316,	0089_QC109_210316,	**16-Mar-2021**	**----**	----	----	**26-Mar-2021**	13-Apr-2021	✓
0089_MW112_210316,	0089_QC112_210316,							
0089_MW109_210316,	0089_MW200_210316,							
0089_MW197_210316,	0089_MW173_210316,							
0089_QC114_210316,	0089_MW195D_210316,							
0089_QC114_210316,	0089_MW236_210316,							
0089_MW195S_210316,	0089_MW193_210316,							
0089_MW120_210316,	0089_MW121_210316,							
0089_QC108_210316,	0089_MW123_210316							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_MW117_210316,	0089_QC109_210316,	**16-Mar-2021**	**----**	----	----	**26-Mar-2021**	13-Apr-2021	✓
0089_MW112_210316,	0089_QC112_210316,							
0089_MW109_210316,	0089_MW200_210316,							
0089_MW197_210316,	0089_MW173_210316,							
0089_QC114_210316,	0089_MW195D_210316,							
0089_QC114_210316,	0089_MW236_210316,							
0089_MW195S_210316,	0089_MW193_210316,							
0089_MW120_210316,	0089_MW121_210316,							
0089_QC108_210316,	0089_MW123_210316							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_MW117_210316,	0089_QC109_210316,	**16-Mar-2021**	**----**	----	----	**18-Mar-2021**	23-Mar-2021	✓
0089_MW112_210316,	0089_QC112_210316,							
0089_MW109_210316,	0089_MW200_210316,							
0089_MW197_210316,	0089_MW173_210316,							
0089_QC114_210316,	0089_MW195D_210316,							
0089_QC114_210316,	0089_MW236_210316,							
0089_MW195S_210316,	0089_MW193_210316,							
0089_MW120_210316,	0089_MW121_210316,							
0089_QC108_210316,	0089_MW123_210316							
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005)								
0089_MW117_210316,	0089_QC109_210316,	**16-Mar-2021**	**----**	----	----	**19-Mar-2021**	13-Apr-2021	✓
0089_MW112_210316,	0089_QC112_210316,							
0089_MW109_210316,	0089_MW200_210316,							
0089_MW197_210316,	0089_MW173_210316,							
0089_QC114_210316,	0089_MW195D_210316,							
0089_QC114_210316,	0089_MW236_210316,							
0089_MW195S_210316,	0089_MW193_210316,							
0089_MW120_210316,	0089_MW121_210316,							
0089_QC108_210316,	0089_MW123_210316							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW117_210316,	0089_QC109_210316,	**16-Mar-2021**	**20-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
0089_MW112_210316,	0089_QC112_210316,							
0089_MW109_210316,	0089_MW200_210316,							
0089_MW197_210316,	0089_MW173_210316,							
0089_QC114_210316,	0089_MW195D_210316,							
0089_QC301_210316,	0089_QC302_210316,							
0089_QC303_210316,	0089_QC401_210316							
HDPE (no PTFE) (EP231X)								
0089_QC402_210316,	0089_QC403_210316,	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
0089_QC114_210316,	0089_MW236_210316,							
0089_MW195S_210316,	0089_MW193_210316,							
0089_MW120_210316,	0089_MW121_210316,							
0089_QC108_210316,	0089_MW123_210316							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW117_210316,	0089_QC109_210316,	**16-Mar-2021**	**20-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
0089_MW112_210316,	0089_QC112_210316,							
0089_MW109_210316,	0089_MW200_210316,							
0089_MW197_210316,	0089_MW173_210316,							
0089_QC114_210316,	0089_MW195D_210316,							
0089_QC301_210316,	0089_QC302_210316,							
0089_QC303_210316,	0089_QC401_210316							
HDPE (no PTFE) (EP231X)								
0089_QC402_210316,	0089_QC403_210316,	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
0089_QC114_210316,	0089_MW236_210316,							
0089_MW195S_210316,	0089_MW193_210316,							
0089_MW120_210316,	0089_MW121_210316,							
0089_QC108_210316,	0089_MW123_210316							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0089_MW117_210316,	0089_QC109_210316,	**16-Mar-2021**	**20-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
0089_MW112_210316,	0089_QC112_210316,							
0089_MW109_210316,	0089_MW200_210316,							
0089_MW197_210316,	0089_MW173_210316,							
0089_QC114_210316,	0089_MW195D_210316,							
0089_QC301_210316,	0089_QC302_210316,							
0089_QC303_210316,	0089_QC401_210316							
HDPE (no PTFE) (EP231X)								
0089_QC402_210316,	0089_QC403_210316,	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
0089_QC114_210316,	0089_MW236_210316,							
0089_MW195S_210316,	0089_MW193_210316,							
0089_MW120_210316,	0089_MW121_210316,							
0089_QC108_210316,	0089_MW123_210316							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW117_210316, 0089_QC109_210316, 0089_MW112_210316, 0089_QC112_210316, 0089_MW109_210316, 0089_MW200_210316, 0089_MW197_210316, 0089_MW173_210316, 0089_QC114_210316, 0089_MW195D_210316, 0089_QC301_210316, 0089_QC302_210316, 0089_QC303_210316, 0089_QC401_210316	**16-Mar-2021**	**20-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC402_210316, 0089_QC403_210316, 0089_QC114_210316, 0089_MW236_210316, 0089_MW195S_210316, 0089_MW193_210316, 0089_MW120_210316, 0089_MW121_210316, 0089_QC108_210316, 0089_MW123_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW117_210316, 0089_QC109_210316, 0089_MW112_210316, 0089_QC112_210316, 0089_MW109_210316, 0089_MW200_210316, 0089_MW197_210316, 0089_MW173_210316, 0089_QC114_210316, 0089_MW195D_210316, 0089_QC301_210316, 0089_QC302_210316, 0089_QC303_210316, 0089_QC401_210316	**16-Mar-2021**	**20-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC402_210316, 0089_QC403_210316, 0089_QC114_210316, 0089_MW236_210316, 0089_MW195S_210316, 0089_MW193_210316, 0089_MW120_210316, 0089_MW121_210316, 0089_QC108_210316, 0089_MW123_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	29	**13.79**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	38	**2.63**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EP2102833**		
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 4
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20307	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 17-Mar-2021 08:00	Issue Date	: 17-Mar-2021
Client Requested Due Date	: 26-Mar-2021	Scheduled Reporting Date	: **26-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 13.4 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 24 / 24

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102833-001	16-Mar-2021 09:24	0089_MW117_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-002	16-Mar-2021 09:24	0089_QC109_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-003	16-Mar-2021 09:52	0089_MW112_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-004	16-Mar-2021 09:52	0089_QC112_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-005	16-Mar-2021 10:08	0089_MW109_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-006	16-Mar-2021 11:00	0089_MW200_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-007	16-Mar-2021 11:23	0089_MW197_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-008	16-Mar-2021 12:12	0089_MW173_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-009	16-Mar-2021 12:12	0089_QC114_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-010	16-Mar-2021 12:44	0089_MW195D_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-017	16-Mar-2021 12:45	0089_QC114_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-018	16-Mar-2021 13:52	0089_MW236_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-019	16-Mar-2021 14:11	0089_MW195S_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-020	16-Mar-2021 14:14	0089_MW193_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-021	16-Mar-2021 14:16	0089_MW120_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-022	16-Mar-2021 14:18	0089_MW121_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-023	16-Mar-2021 14:21	0089_QC108_210316	✓	✓	✓	✓	✓	✓	✓
EP2102833-024	16-Mar-2021 14:24	0089_MW123_210316	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102833-001	16-Mar-2021 09:24	0089_MW117_210316	✓
EP2102833-002	16-Mar-2021 09:24	0089_QC109_210316	✓
EP2102833-003	16-Mar-2021 09:52	0089_MW112_210316	✓
EP2102833-004	16-Mar-2021 09:52	0089_QC112_210316	✓
EP2102833-005	16-Mar-2021 10:08	0089_MW109_210316	✓
EP2102833-006	16-Mar-2021 11:00	0089_MW200_210316	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102833-007	16-Mar-2021 11:23	0089_MW197_210316	✓
EP2102833-008	16-Mar-2021 12:12	0089_MW173_210316	✓
EP2102833-009	16-Mar-2021 12:12	0089_QC114_210316	✓
EP2102833-010	16-Mar-2021 12:44	0089_MW195D_210316	✓
EP2102833-011	16-Mar-2021 07:58	0089_QC301_210316	✓
EP2102833-012	16-Mar-2021 07:59	0089_QC302_210316	✓
EP2102833-013	16-Mar-2021 08:00	0089_QC303_210316	✓
EP2102833-014	16-Mar-2021 08:00	0089_QC401_210316	✓
EP2102833-015	16-Mar-2021 08:01	0089_QC402_210316	✓
EP2102833-016	16-Mar-2021 08:01	0089_QC403_210316	✓
EP2102833-017	16-Mar-2021 12:45	0089_QC114_210316	✓
EP2102833-018	16-Mar-2021 13:52	0089_MW236_210316	✓
EP2102833-019	16-Mar-2021 14:11	0089_MW195S_210316	✓
EP2102833-020	16-Mar-2021 14:14	0089_MW193_210316	✓
EP2102833-021	16-Mar-2021 14:16	0089_MW120_210316	✓
EP2102833-022	16-Mar-2021 14:18	0089_MW121_210316	✓
EP2102833-023	16-Mar-2021 14:21	0089_QC108_210316	✓
EP2102833-024	16-Mar-2021 14:24	0089_MW123_210316	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
0089_MW109_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW112_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW117_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW120_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW121_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW123_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW173_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW193_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW195D_2103	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW195S_2103	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW197_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW200_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW236_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_QC108_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_QC109_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_QC112_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_QC114_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_QC114_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

ALS COC#: 20307 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/3 8am	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW117		16/03/2021 09:24 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8		X		
002	0089_QC109		16/03/2021 09:24 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
003	0089_MW112		16/03/2021 09:52 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
004	0089_QC112		16/03/2021 09:52 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
005	0089_MW109		16/03/2021 10:08 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8		X		
006	0089_MW200		16/03/2021 11:00 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8		X		
007	0089_MW197		16/03/2021 11:23 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
008	0089_MW173		16/03/2021 12:12 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
009	0089_QC114		16/03/2021 12:12 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		

Environmental Division
Perth

Work Order Reference
EP2102833

Telephone : -- 61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 20307 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW195D		16/03/2021 12:44 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
011	0089_QC301		16/03/2021 07:58 AM	Water	ALS: 2 Non ALS: 0	No		X			
012	0089_QC302		16/03/2021 07:59 AM	Water	ALS: 2 Non ALS: 0	No		X			
013	0089_QC303		16/03/2021 08:00 AM	Water	ALS: 2 Non ALS: 0	No		X			
014	0089_QC401		16/03/2021 08:00 AM	Water	ALS: 2 Non ALS: 0	No		X			
015	0089_QC402		16/03/2021 08:01 AM	Water	ALS: 2 Non ALS: 0	No		X			
016	0089_QC403		16/03/2021 08:01 AM	Water	ALS: 2 Non ALS: 0	No		X			
017	0089_QC114		16/03/2021 12:45 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
018	0089_MW236		16/03/2021 01:52 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		

CHAIN OF CUSTODY

ALS COC#: **20307** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	0089_MW195S		16/03/2021 02:11 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
020	0089_MW193		16/03/2021 02:14 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
021	0089_MW120		16/03/2021 02:16 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
022	0089_MW121		16/03/2021 02:18 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
023	0089_QC108		16/03/2021 02:21 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
024	0089_MW123		16/03/2021 02:24 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		

CHAIN OF CUSTODY

ALS COC#: 20307 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW117	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_QC109	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW112	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_QC112	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW109	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **20307** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW200	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW197	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW173	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_QC114	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_MW195D	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
017	0089_QC114	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 20307 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

018	0089_MW236	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
019	0089_MW195S	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
020	0089_MW193	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
021	0089_MW120	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
022	0089_MW121	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
023	0089_QC108	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **20307** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

024	0089_MW123	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 20307 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW117	Clear Plastic Bottle - Natural	250 mL	00070719175424	Green	No	
001	0089_MW117	HDPE (no PTFE)	20 mL	00352010071374	Grey	No	
001	0089_MW117	HDPE (no PTFE)	20 mL	00352010071376	Grey	No	
001	0089_MW117	HDPE (no PTFE)	20 mL	00352010071216	Grey	No	
001	0089_MW117	HDPE (no PTFE)	20 mL	00352010071379	Grey	No	
001	0089_MW117	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001803	Purple	No	
002	0089_QC109	Clear Plastic Bottle - Natural	250 mL	00070719175466	Green	No	
002	0089_QC109	HDPE (no PTFE)	20 mL	00352010080449	Grey	No	
002	0089_QC109	HDPE (no PTFE)	20 mL	00352010071665	Grey	No	
002	0089_QC109	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001744	Purple	No	
003	0089_MW112	Clear Plastic Bottle - Natural	250 mL	00070719175504	Green	No	
003	0089_MW112	HDPE (no PTFE)	20 mL	00352010071371	Grey	No	
003	0089_MW112	HDPE (no PTFE)	20 mL	00352010071463	Grey	No	
003	0089_MW112	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001554	Purple	No	
004	0089_QC112	Clear Plastic Bottle - Natural	250 mL	00070719175409	Green	No	
004	0089_QC112	HDPE (no PTFE)	20 mL	00352010071140	Grey	No	
004	0089_QC112	HDPE (no PTFE)	20 mL	00352010071243	Grey	No	
004	0089_QC112	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001800	Purple	No	
005	0089_MW109	Clear Plastic Bottle - Natural	250 mL	00070719175557	Green	No	
005	0089_MW109	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001846	Purple	No	
005	0089_MW109	HDPE (no PTFE)	20 mL	00352010071253	Grey	No	
005	0089_MW109	HDPE (no PTFE)	20 mL	00352010071407	Grey	No	
005	0089_MW109	HDPE (no PTFE)	20 mL	00352010071572	Grey	No	
005	0089_MW109	HDPE (no PTFE)	20 mL	00352010071268	Grey	No	
006	0089_MW200	Clear Plastic Bottle - Natural	250 mL	00070719175468	Green	No	
006	0089_MW200	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001859	Purple	No	

CHAIN OF CUSTODY

ALS COC#: **20307** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW200	HDPE (no PTFE)	20 mL	00352010071458	Grey	No	
006	0089_MW200	HDPE (no PTFE)	20 mL	00352010071904	Grey	No	
006	0089_MW200	HDPE (no PTFE)	20 mL	00352010071240	Grey	No	
006	0089_MW200	HDPE (no PTFE)	20 mL	00352010071933	Grey	No	
007	0089_MW197	Clear Plastic Bottle - Natural	250 mL	00070719175516	Green	No	
007	0089_MW197	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001315	Purple	No	
007	0089_MW197	HDPE (no PTFE)	20 mL	00352010071579	Grey	No	
007	0089_MW197	HDPE (no PTFE)	20 mL	00352010071394	Grey	No	
008	0089_MW173	Clear Plastic Bottle - Natural	250 mL	00070719175467	Green	No	
008	0089_MW173	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001817	Purple	No	
008	0089_MW173	HDPE (no PTFE)	20 mL	00352010080686	Grey	No	
008	0089_MW173	HDPE (no PTFE)	20 mL	00352010080576	Grey	No	
009	0089_QC114	Clear Plastic Bottle - Natural	250 mL	00070719175480	Green	No	
009	0089_QC114	HDPE (no PTFE)	20 mL	00352010080816	Grey	No	
009	0089_QC114	HDPE (no PTFE)	20 mL	00352010071850	Grey	No	
009	0089_QC114	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001861	Purple	No	
010	0089_MW195D	Clear Plastic Bottle - Natural	250 mL	00070719175437	Green	No	
010	0089_MW195D	HDPE (no PTFE)	20 mL	00352010080821	Grey	No	
010	0089_MW195D	HDPE (no PTFE)	20 mL	00352010080462	Grey	No	
010	0089_MW195D	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001701	Purple	No	
011	0089_QC301	HDPE (no PTFE)	20 mL	00352010071471	Grey	No	
011	0089_QC301	HDPE (no PTFE)	20 mL	00352010071123	Grey	No	
012	0089_QC302	HDPE (no PTFE)	20 mL	00352010071419	Grey	No	
012	0089_QC302	HDPE (no PTFE)	20 mL	00352010071239	Grey	No	
013	0089_QC303	HDPE (no PTFE)	20 mL	00352010071372	Grey	No	
013	0089_QC303	HDPE (no PTFE)	20 mL	00352010071257	Grey	No	
014	0089_QC401	HDPE (no PTFE)	20 mL	00352010071548	Grey	No	

CHAIN OF CUSTODY

ALS COC#: **20307** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

014	0089_QC401	HDPE (no PTFE)	20 mL	00352010071447	Grey	No	
015	0089_QC402	HDPE (no PTFE)	20 mL	00352010071275	Grey	No	
015	0089_QC402	HDPE (no PTFE)	20 mL	00352010071165	Grey	No	
016	0089_QC403	HDPE (no PTFE)	20 mL	00352010071414	Grey	No	
016	0089_QC403	HDPE (no PTFE)	20 mL	00352010071620	Grey	No	
017	0089_QC114	Clear Plastic Bottle - Natural	250 mL	00070719175405	Green	No	
017	0089_QC114	HDPE (no PTFE)	20 mL	00352010080596	Grey	No	
017	0089_QC114	HDPE (no PTFE)	20 mL	00352010080430	Grey	No	
017	0089_QC114	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001753	Purple	No	
018	0089_MW236	HDPE (no PTFE)	20 mL	00352010071628	Grey	No	
018	0089_MW236	HDPE (no PTFE)	20 mL	00352010071602	Grey	No	
018	0089_MW236	Clear Plastic Bottle - Natural	250 mL	00070719175540	Green	No	
018	0089_MW236	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049487	Purple	No	
019	0089_MW195S	Clear Plastic Bottle - Natural	250 mL	00070719175483	Green	No	
019	0089_MW195S	HDPE (no PTFE)	20 mL	00352010071150	Grey	No	
019	0089_MW195S	HDPE (no PTFE)	20 mL	00352010071281	Grey	No	
019	0089_MW195S	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001847	Purple	No	
020	0089_MW193	Clear Plastic Bottle - Natural	250 mL	00070719175598	Green	No	
020	0089_MW193	HDPE (no PTFE)	20 mL	00352010071646	Grey	No	
020	0089_MW193	HDPE (no PTFE)	20 mL	00352010071612	Grey	No	
020	0089_MW193	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049546	Purple	No	
021	0089_MW120	Clear Plastic Bottle - Natural	250 mL	00070719175512	Green	No	
021	0089_MW120	HDPE (no PTFE)	20 mL	00352010071586	Grey	No	
021	0089_MW120	HDPE (no PTFE)	20 mL	00352010071693	Grey	No	
021	0089_MW120	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049466	Purple	No	
022	0089_MW121	Clear Plastic Bottle - Natural	250 mL	00070719175519	Green	No	
022	0089_MW121	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049150	Purple	No	

CHAIN OF CUSTODY

ALS COC#: **20307** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

022	0089_MW121	HDPE (no PTFE)	20 mL	00352010071242	Grey	No	
022	0089_MW121	HDPE (no PTFE)	20 mL	00352010071592	Grey	No	
023	0089_QC108	Clear Plastic Bottle - Natural	250 mL	00070719175509	Green	No	
023	0089_QC108	HDPE (no PTFE)	20 mL	00352010071640	Grey	No	
023	0089_QC108	HDPE (no PTFE)	20 mL	00352010071456	Grey	No	
023	0089_QC108	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049477	Purple	No	
024	0089_MW123	Clear Plastic Bottle - Natural	250 mL	00070719175522	Green	No	
024	0089_MW123	HDPE (no PTFE)	20 mL	00352010071638	Grey	No	
024	0089_MW123	HDPE (no PTFE)	20 mL	00352010071577	Grey	No	
024	0089_MW123	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049450	Purple	No	

Total Bottle Count: ALS: 90, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102834**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021 08:00
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20332	Issue Date	: 25-Mar-2021 13:27
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231X: Positive result for analyte Perfluorooctane sulfonic acid (PFOS) on samples EP2102834_001 & EP2102834_003 have been confirmed by re-extraction and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW369_210316	0089_PW345_210316	----	----	----
			Sampling date / time	16-Mar-2021 14:13	16-Mar-2021 14:15	----	----	----
Compound	CAS Number	LOR	Unit	EP2102834-002	EP2102834-003	--------	--------	--------
				Result	Result	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.65	7.58	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	44700	43100	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	353	449	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	179	277	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	179	277	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2920	2890	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20800	20300	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	524	516	----	----	----
Magnesium	7439-95-4	1	mg/L	1580	1470	----	----	----
Sodium	7440-23-5	1	mg/L	12400	11500	----	----	----
Potassium	7440-09-7	1	mg/L	662	610	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	651	638	----	----	----
ø Total Cations	----	0.01	meq/L	712	662	----	----	----
ø Ionic Balance	----	0.01	%	4.50	1.86	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	9	13	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW369_210316	0089_PW345_210316	----	----	----
				Sampling date / time	16-Mar-2021 14:13	16-Mar-2021 14:15	----	----	----
Compound	CAS Number	LOR	Unit		EP2102834-002	EP2102834-003	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.02**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW369_210316	0089_PW345_210316	----	----	----
				Sampling date / time	16-Mar-2021 14:13	16-Mar-2021 14:15	----	----	----
Compound	CAS Number	LOR	Unit		EP2102834-002	EP2102834-003	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.02**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.02**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.02**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.1**	**86.3**	----	----	----
13C8-PFOA	----	0.02	%		**96.7**	**98.2**	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW370_210316	----	----	----	----
				Sampling date / time	16-Mar-2021 11:06	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102834-001	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.80	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		43300	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		236	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		119	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		119	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2840	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		20400	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		474	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1490	----	----	----	----
Sodium	7440-23-5	1	mg/L		11700	----	----	----	----
Potassium	7440-09-7	1	mg/L		626	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		637	----	----	----	----
ø Total Cations	----	0.01	meq/L		671	----	----	----	----
ø Ionic Balance	----	0.01	%		2.62	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		8	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW370_210316	----	----	----	----
			Sampling date / time		16-Mar-2021 11:06	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102834-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.01**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW370_210316	----	----	----	----
				Sampling date / time	16-Mar-2021 11:06	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102834-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.01**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.01**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.01**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**86.6**	----	----	----	----
13C8-PFOA	----	0.02	%		**95.2**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102834**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20332	Issue Date	: 25-Mar-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

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Accreditation No. 825
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3580472)									
EP2102833-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.62	7.68	0.784	0% - 20%
EP2102833-018	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.95	7.96	0.126	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3580474)									
EP2102834-003	0089_PW345_210316	EA005-P: pH Value	----	0.01	pH Unit	7.58	7.59	0.132	0% - 20%
EP2102836-010	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.75	7.74	0.129	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3579814)									
EP2102834-001	0089_SW370_210316	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	43300	41900	3.31	0% - 20%
EP2102870-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	235	246	4.57	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3579815)									
EP2102834-001	0089_SW370_210316	EA025H: Suspended Solids (SS)	----	5	mg/L	236	260	9.66	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3580471)									
EP2102833-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	478	410	15.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	478	410	15.3	0% - 20%
EP2102833-018	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	238	239	0.474	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	238	239	0.474	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3580473)									
EP2102834-003	0089_PW345_210316	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	277	279	0.561	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	277	279	0.561	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3580473) - continued									
EP2102836-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	142	143	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	142	143	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3570093)									
EP2102739-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1480	1480	0.350	0% - 20%
EP2102739-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	757	769	1.57	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3570094)									
EP2102739-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	5520	5540	0.305	0% - 20%
EP2102739-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	346	348	0.402	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3568781)									
EP2102833-019	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	186	184	0.745	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	155	154	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	650	648	0.280	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	53	53	0.00	0% - 20%
EP2102842-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	22	21	4.66	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	210	215	2.13	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3575126)									
EP2102833-021	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	13	16	16.5	No Limit
EP2102836-004	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	3	3	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3580472)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3580474)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3579814)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114
				<10	1000 mg/L	104	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3579815)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	107	89.1	120
				<5	1000 mg/L	106	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3580471)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	87.0	81.2	126
				<1	200 mg/L	94.1	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3580473)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	88.7	81.2	126
				<1	200 mg/L	92.4	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3570093)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	109	87.7	113
				<1	500 mg/L	106	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3570094)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	95.1	87.9	114
				<1	1000 mg/L	90.2	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3568781)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	92.8	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	93.4	88.0	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3568781) - continued								
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	91.3	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.1	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3575126)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	110	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3576257)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	115	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	116	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	121	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	117	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3576257)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	117	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	122	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	125	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	126	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	123	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	123	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	121	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	128	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	124	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	122	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3576257)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	114	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	116	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	115	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	112	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	121	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	116	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	126	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3576257)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	117	63.0	143

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3576257) - continued								
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	111	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	122	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	120	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3570093)							
EP2102739-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3570094)							
EP2102739-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3575126)							
EP2102833-022	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	90.7	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102834**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 25-Mar-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 3
Order number	: DEF19009/730	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102739--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102739--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_SW370_210316, 0089_PW369_210316, 0089_PW345_210316	----	----	----	23-Mar-2021	16-Mar-2021	**7**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	17	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_SW370_210316, 0089_PW369_210316, 0089_PW345_210316	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	16-Mar-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_SW370_210316, 0089_PW369_210316, 0089_PW345_210316	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	23-Mar-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW370_210316, 0089_PW369_210316, 0089_PW345_210316	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	23-Mar-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW370_210316, 0089_PW369_210316, 0089_PW345_210316	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	30-Mar-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW370_210316, 0089_PW369_210316, 0089_PW345_210316	**16-Mar-2021**	**----**	----	----	**24-Mar-2021**	13-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW370_210316, 0089_PW369_210316, 0089_PW345_210316	**16-Mar-2021**	**----**	----	----	**24-Mar-2021**	13-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW370_210316, 0089_PW369_210316, 0089_PW345_210316	**16-Mar-2021**	**----**	----	----	**18-Mar-2021**	23-Mar-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW370_210316, 0089_PW369_210316, 0089_PW345_210316	**16-Mar-2021**	**----**	----	----	**19-Mar-2021**	13-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW370_210316, 0089_PW369_210316, 0089_PW345_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW370_210316, 0089_PW369_210316, 0089_PW345_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW370_210316, 0089_PW345_210316	0089_PW369_210316,	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021 ✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW370_210316, 0089_PW345_210316	0089_PW369_210316,	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021 ✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW370_210316, 0089_PW345_210316	0089_PW369_210316,	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021 ✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	17	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	8	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	17	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102834**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20332	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 17-Mar-2021 08:00	Issue Date	: 17-Mar-2021
Client Requested Due Date	: 26-Mar-2021	Scheduled Reporting Date	: **26-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 13.4 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102834-001	16-Mar-2021 11:06	0089_SW370_210316	✓	✓	✓	✓	✓	✓	✓
EP2102834-002	16-Mar-2021 14:13	0089_PW369_210316	✓	✓	✓	✓	✓	✓	✓
EP2102834-003	16-Mar-2021 14:15	0089_PW345_210316	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102834-001	16-Mar-2021 11:06	0089_SW370_210316	✓
EP2102834-002	16-Mar-2021 14:13	0089_PW369_210316	✓
EP2102834-003	16-Mar-2021 14:15	0089_PW345_210316	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
0089_PW345_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_PW369_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_SW370_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

(ALS) COC#: **20332** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	[redacted]:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	17/3 8am	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW370		16/03/2021 11:06 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW369		16/03/2021 02:13 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_PW345		16/03/2021 02:15 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2102834

Telephone : 61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: 20332 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW370	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW369	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW345	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 20332 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW370	Clear Plastic Bottle - Natural	250 mL	00070719175475	Green	No	
001	0089_SW370	HDPE (no PTFE)	20 mL	00352010071260	Grey	No	
001	0089_SW370	HDPE (no PTFE)	20 mL	00352010071585	Grey	No	
001	0089_SW370	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001344	Purple	No	
002	0089_PW369	Clear Plastic Bottle - Natural	250 mL	00070719175473	Green	No	
002	0089_PW369	HDPE (no PTFE)	20 mL	00352010071109	Grey	No	
002	0089_PW369	HDPE (no PTFE)	20 mL	00352010071570	Grey	No	
002	0089_PW369	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001831	Purple	No	
003	0089_PW345	Clear Plastic Bottle - Natural	250 mL	00070719175428	Green	No	
003	0089_PW345	HDPE (no PTFE)	20 mL	00352010080673	Grey	No	
003	0089_PW345	HDPE (no PTFE)	20 mL	00352010080791	Grey	No	
003	0089_PW345	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001805	Purple	No	

Total Bottle Count: ALS: 12, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102835**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021 08:00
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Mar-2021
C-O-C number	: 20347	Issue Date	: 24-Mar-2021 12:25
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD345_210316	0089_SD369_210316	----	----	----
			Sampling date / time	16-Mar-2021 14:12	16-Mar-2021 14:19	----	----	----
Compound	CAS Number	LOR	Unit	EP2102835-001	EP2102835-002	--------	--------	--------
				Result	Result	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**8.3**	**8.2**	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**3760**	**5060**	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**28.6**	**36.6**	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**3.7**	**3.8**	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.6**	**1.3**	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	**0.2**	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**4.5**	**5.3**	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**3.4**	**4.0**	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	**0.9**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0017**	<0.0002	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD345_210316	0089_SD369_210316	----	----	----
				Sampling date / time	16-Mar-2021 14:12	16-Mar-2021 14:19	----	----	----
Compound	CAS Number	LOR	Unit		EP2102835-001	EP2102835-002	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0017**	<0.0002	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)			Sample ID	**0089_SD345_210316**	**0089_SD369_210316**	**----**	**----**	**----**
			Sampling date / time	16-Mar-2021 14:12	16-Mar-2021 14:19	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EP2102835-001**	**EP2102835-002**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0017**	<0.0002	**----**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0017**	<0.0002	**----**	**----**	**----**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**96.0**	**93.0**	**----**	**----**	**----**
13C8-PFOA	----	0.0002	%	**103**	**96.0**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102835**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Mar-2021
C-O-C number	: 20347	Issue Date	: 24-Mar-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3569143)									
EP2102754-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.6	8.7	1.73	0% - 20%
EP2102757-005	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.8	8.8	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3569142)									
EP2102754-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3980	3990	0.251	0% - 20%
EP2102757-005	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	2510	2500	0.399	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3569158)									
EP2102835-001	0089_SD345_210316	EA055: Moisture Content	----	0.1	%	28.6	27.1	5.36	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3569140)									
EP2102835-001	0089_SD345_210316	ED008: Exchangeable Sodium Percent	----	0.1	%	3.4	3.4	0.00	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	3.7	3.5	5.42	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.6	0.5	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.1	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	4.5	4.2	6.64	0% - 20%
EP004: Organic Matter (QC Lot: 3569135)									
EP2102835-001	0089_SD345_210316	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3578102)									
EP2102835-001	0089_SD345_210316	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0017	0.0018	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
ES2109924-010	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3578102) - continued									
ES2109924-010	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3578102)									
EP2102835-001	0089_SD345_210316	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
ES2109924-010	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3578102)									
EP2102835-001	0089_SD345_210316	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3578102) - continued									
EP2102835-001	0089_SD345_210316	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES2109924-010	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3578102)									
EP2102835-001	0089_SD345_210316	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES2109924-010	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3569143)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	70.0	130
				----	7 pH Unit	99.8	70.0	130
EA010: Conductivity (1:5) (QCLot: 3569142)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
ED008: Exchangeable Cations (QCLot: 3569140)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	86.7	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	88.4	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	97.3	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	97.5	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	87.4	79.9	110
EP004: Organic Matter (QCLot: 3569135)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	98.7	70.0	120
				<0.5	85 %	85.4	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3578102)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578102)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	89.8	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	100	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3578102)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3578102) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.8	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.8	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3578102)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	104	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	109	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	95.2	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	104	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3578102)							
EP2102835-001	0089_SD345_210316	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	116	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	123	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	109	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	116	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	126	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	112	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578102)							
EP2102835-001	0089_SD345_210316	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	103	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	116	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	118	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	109	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	112	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	110	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	118	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578102) - continued							
EP2102835-001	0089_SD345_210316	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	118	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	112	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	116	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	100	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3578102)							
EP2102835-001	0089_SD345_210316	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	118	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	111	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	100	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	103	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	102	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	112	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	108	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3578102)							
EP2102835-001	0089_SD345_210316	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	120	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	116	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	96.8	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	124	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102835**	Page	: 1 of 4
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 24-Mar-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 2
Order number	: DEF19009/730	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002)								
0089_SD345_210316,	0089_SD369_210316	**16-Mar-2021**	**18-Mar-2021**	23-Mar-2021	✓	**18-Mar-2021**	18-Mar-2021	✓
EA010: Conductivity (1:5)								
Soil Glass Jar - Unpreserved (EA010)								
0089_SD345_210316,	0089_SD369_210316	**16-Mar-2021**	**18-Mar-2021**	23-Mar-2021	✓	**18-Mar-2021**	15-Apr-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
0089_SD345_210316,	0089_SD369_210316	**16-Mar-2021**	**----**	----	----	**17-Mar-2021**	30-Mar-2021	✓
ED008: Exchangeable Cations								
Soil Glass Jar - Unpreserved (ED008)								
0089_SD345_210316,	0089_SD369_210316	**16-Mar-2021**	**22-Mar-2021**	13-Apr-2021	✓	**22-Mar-2021**	13-Apr-2021	✓
EP004: Organic Matter								
Soil Glass Jar - Unpreserved (EP004)								
0089_SD345_210316,	0089_SD369_210316	**16-Mar-2021**	**23-Mar-2021**	13-Apr-2021	✓	**23-Mar-2021**	13-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0089_SD345_210316,	0089_SD369_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	01-May-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
0089_SD345_210316,	0089_SD369_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	01-May-2021	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X)								
0089_SD345_210316,	0089_SD369_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	01-May-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0089_SD345_210316,	0089_SD369_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	01-May-2021	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X)								
0089_SD345_210316,	0089_SD369_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	01-May-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	8	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102835**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20347	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 17-Mar-2021 08:00	Issue Date	: 17-Mar-2021
Client Requested Due Date	: 26-Mar-2021	Scheduled Reporting Date	: **26-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 13.4 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2102835-001	16-Mar-2021 14:12	0089_SD345_210316	✓	✓	✓	✓
EP2102835-002	16-Mar-2021 14:19	0089_SD369_210316	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 20347 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO [redacted]

EMAIL INVOICES TO

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] 17/3 8am	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD345		16/03/2021 02:12 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD369		16/03/2021 02:19 PM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division Perth

Work Order Reference

EP2102835

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: 20347 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD345	Soil Glass Jar - Unpreserved	150 mL	00261020060117	Orange	No	
001	0089_SD345	HDPE Soil Jar	200 mL	00620719085957	Grey	No	
002	0089_SD369	Soil Glass Jar - Unpreserved	150 mL	00261020060025	Orange	No	
002	0089_SD369	HDPE Soil Jar	200 mL	00620719085768	Grey	No	

Total Bottle Count: ALS: 4, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102836**	Page	: 1 of 15
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021 08:00
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20313	Issue Date	: 26-Mar-2021 12:37
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 14		
No. of samples analysed	: 14		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC110_210316	0089_MW149_210316	0089_PW358_210316	0089_QC113_210316	0089_PW330_210316
				Sampling date / time	16-Mar-2021 09:24	16-Mar-2021 09:39	16-Mar-2021 09:55	16-Mar-2021 09:57	16-Mar-2021 10:25
Compound	CAS Number	LOR	Unit		EP2102836-002	EP2102836-005	EP2102836-006	EP2102836-007	EP2102836-009
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.78	7.71	7.73	7.78	7.77
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		43400	39600	43500	43700	43700
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		115	347	106	82	148
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		148	232	131	137	134
Total Alkalinity as CaCO3	----	1	mg/L		148	232	131	137	134
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3020	2810	2990	3060	2920
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		21100	19400	21200	21200	21200
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		511	498	489	529	511
Magnesium	7439-95-4	1	mg/L		1570	1480	1530	1640	1590
Sodium	7440-23-5	1	mg/L		12300	11400	12000	12800	12400
Potassium	7440-09-7	1	mg/L		666	653	646	704	685
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		661	610	663	664	661
ø Total Cations	----	0.01	meq/L		707	659	689	736	713
ø Ionic Balance	----	0.01	%		3.34	3.85	1.92	5.12	3.76
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		4	3	5	4	2
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC110_210316	0089_MW149_210316	0089_PW358_210316	0089_QC113_210316	0089_PW330_210316
				Sampling date / time	16-Mar-2021 09:24	16-Mar-2021 09:39	16-Mar-2021 09:55	16-Mar-2021 09:57	16-Mar-2021 10:25
Compound	CAS Number	LOR	Unit		EP2102836-002	EP2102836-005	EP2102836-006	EP2102836-007	EP2102836-009
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC110_210316	0089_MW149_210316	0089_PW358_210316	0089_QC113_210316	0089_PW330_210316
				Sampling date / time	16-Mar-2021 09:24	16-Mar-2021 09:39	16-Mar-2021 09:55	16-Mar-2021 09:57	16-Mar-2021 10:25
Compound	CAS Number	LOR	Unit		EP2102836-002	EP2102836-005	EP2102836-006	EP2102836-007	EP2102836-009
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**90.6**	**98.5**	**105**	**99.5**	**103**
13C8-PFOA	----	0.02	%		**101**	**95.5**	**99.5**	**105**	**97.0**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_SW150_210316	0089_PW331_210316	0089_PW356_210316	----	----
			Sampling date / time	16-Mar-2021 10:42	16-Mar-2021 11:17	16-Mar-2021 11:21	----	----
Compound	CAS Number	LOR	Unit	EP2102836-012	EP2102836-013	EP2102836-014	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.05	7.72	7.72	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	42400	41600	43400	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	145	224	1410	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	113	172	317	----	----
Total Alkalinity as CaCO3	----	1	mg/L	113	172	317	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2940	2970	2960	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20900	20600	20700	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	542	538	584	----	----
Magnesium	7439-95-4	1	mg/L	1700	1630	1720	----	----
Sodium	7440-23-5	1	mg/L	13400	12800	13300	----	----
Potassium	7440-09-7	1	mg/L	732	700	725	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	653	646	652	----	----
ø Total Cations	----	0.01	meq/L	768	736	768	----	----
ø Ionic Balance	----	0.01	%	8.12	6.46	8.16	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	2	6	5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_SW150_210316	0089_PW331_210316	0089_PW356_210316	----	----
				Sampling date / time	16-Mar-2021 10:42	16-Mar-2021 11:17	16-Mar-2021 11:21	----	----
Compound	CAS Number	LOR	Unit		EP2102836-012	EP2102836-013	EP2102836-014	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_SW150_210316	0089_PW331_210316	0089_PW356_210316	----	----
				Sampling date / time	16-Mar-2021 10:42	16-Mar-2021 11:17	16-Mar-2021 11:21	----	----
Compound	CAS Number	LOR	Unit		EP2102836-012	EP2102836-013	EP2102836-014	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**105**	**103**	**89.5**	----	----
13C8-PFOA	----	0.02	%		**104**	**99.9**	**97.9**	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_PW329_210316	0089_SW156_210316	0089_QC111_210316	0089_SW154_210316	0089_PW357_210316
			Sampling date / time	16-Mar-2021 09:22	16-Mar-2021 09:30	16-Mar-2021 09:33	16-Mar-2021 10:04	16-Mar-2021 10:38
Compound	CAS Number	LOR	Unit	EP2102836-001	EP2102836-003	EP2102836-004	EP2102836-008	EP2102836-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.77	8.01	7.99	8.00	7.75
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	43300	43200	41500	43000	42300
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	85	12	43	58	194
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	186	113	116	114	142
Total Alkalinity as CaCO3	----	1	mg/L	186	113	116	114	142
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3000	3000	2950	2870	2890
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	21000	21200	20800	21300	21100
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	517	515	520	493	504
Magnesium	7439-95-4	1	mg/L	1620	1630	1630	1570	1580
Sodium	7440-23-5	1	mg/L	12600	12900	12800	12200	12300
Potassium	7440-09-7	1	mg/L	689	700	694	670	671
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	658	663	650	663	658
ø Total Cations	----	0.01	meq/L	725	739	735	702	707
ø Ionic Balance	----	0.01	%	4.79	5.43	6.07	2.84	3.60
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	3	2	3	8	4
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW329_210316	0089_SW156_210316	0089_QC111_210316	0089_SW154_210316	0089_PW357_210316
				Sampling date / time	16-Mar-2021 09:22	16-Mar-2021 09:30	16-Mar-2021 09:33	16-Mar-2021 10:04	16-Mar-2021 10:38
Compound	CAS Number	LOR	Unit		EP2102836-001	EP2102836-003	EP2102836-004	EP2102836-008	EP2102836-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW329_210316	0089_SW156_210316	0089_QC111_210316	0089_SW154_210316	0089_PW357_210316
				Sampling date / time	16-Mar-2021 09:22	16-Mar-2021 09:30	16-Mar-2021 09:33	16-Mar-2021 10:04	16-Mar-2021 10:38
Compound	CAS Number	LOR	Unit		EP2102836-001	EP2102836-003	EP2102836-004	EP2102836-008	EP2102836-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**91.0**	**94.0**	**106**	**87.1**	**102**
13C8-PFOA	----	0.02	%		**99.1**	**98.1**	**105**	**97.8**	**100**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW152_210316	----	----	----	----
				Sampling date / time	16-Mar-2021 10:40	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102836-011	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.02	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		42400	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		104	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		114	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		114	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2930	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		21000	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		515	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1620	----	----	----	----
Sodium	7440-23-5	1	mg/L		12600	----	----	----	----
Potassium	7440-09-7	1	mg/L		690	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		656	----	----	----	----
ø Total Cations	----	0.01	meq/L		725	----	----	----	----
ø Ionic Balance	----	0.01	%		5.00	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		2	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW152_210316	----	----	----	----
			Sampling date / time		16-Mar-2021 10:40	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102836-011	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW152_210316	----	----	----	----
				Sampling date / time	16-Mar-2021 10:40	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102836-011	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**100**	----	----	----	----
13C8-PFOA	----	0.02	%		**97.1**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102836**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20313	Issue Date	: 26-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 14		
No. of samples analysed	: 14		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3580474)									
EP2102834-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.58	7.59	0.132	0% - 20%
EP2102836-010	0089_PW357_210316	EA005-P: pH Value	----	0.01	pH Unit	7.75	7.74	0.129	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3579806)									
EP2102836-001	0089_PW329_210316	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	43300	43500	0.530	0% - 20%
EP2102836-009	0089_PW330_210316	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	43700	43800	0.274	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3579814)									
EP2102834-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	43300	41900	3.31	0% - 20%
EP2102870-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	235	246	4.57	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3579807)									
EP2102836-001	0089_PW329_210316	EA025H: Suspended Solids (SS)	----	5	mg/L	85	84	0.00	0% - 50%
EP2102926-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3579815)									
EP2102834-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	236	260	9.66	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3580473)									
EP2102834-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	277	279	0.561	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	277	279	0.561	0% - 20%
EP2102836-010	0089_PW357_210316	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	142	143	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	142	143	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3572777)									
EP2102836-001	0089_PW329_210316	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3000	3030	1.01	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3572777) - continued									
EP2102901-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3000	3000	0.149	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3572779)									
EP2102836-008	0089_SW154_210316	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2870	2860	0.393	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3572778)									
EP2102836-001	0089_PW329_210316	ED045G: Chloride	16887-00-6	1	mg/L	21000	20800	0.840	0% - 20%
EP2102901-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	21100	21200	0.507	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3572780)									
EP2102858-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	113000	117000	3.55	0% - 20%
EP2102836-008	0089_SW154_210316	ED045G: Chloride	16887-00-6	1	mg/L	21300	20700	2.53	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3571346)									
EP2102836-001	0089_PW329_210316	ED093F: Calcium	7440-70-2	1	mg/L	517	529	2.20	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1620	1660	2.18	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12600	13000	2.40	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	689	711	3.16	0% - 20%
EP2102836-011	0089_SW152_210316	ED093F: Calcium	7440-70-2	1	mg/L	515	517	0.428	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1620	1640	0.842	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12600	12800	0.971	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	690	702	1.77	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3575126)									
EP2102833-021	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	13	16	16.5	No Limit
EP2102836-004	0089_QC111_210316	EP005: Total Organic Carbon	----	1	mg/L	3	3	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3578688)									
EP2102836-014	0089_PW356_210316	EP005: Total Organic Carbon	----	1	mg/L	5	4	0.00	No Limit
EP2102837-010	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	22	26	16.6	0% - 50%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3580474)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3579806)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	104	88.1	114
				<10	1000 mg/L	104	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3579814)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114
				<10	1000 mg/L	104	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3579807)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	102	89.1	120
				<5	1000 mg/L	104	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3579815)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	107	89.1	120
				<5	1000 mg/L	106	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3580473)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	88.7	81.2	126
				<1	200 mg/L	92.4	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572777)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	106	87.7	113
				<1	500 mg/L	105	87.7	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572779)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	107	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3572778)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	87.9	114
				<1	1000 mg/L	101	87.9	114
ED045G: Chloride by Discrete Analyser (QCLot: 3572780)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	87.9	114
				<1	1000 mg/L	102	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3571346)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3571346) - continued								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.8	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.4	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.9	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.4	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3575126)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	110	87.2	116
EP005: Total Organic Carbon (TOC) (QCLot: 3578688)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	113	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3576257)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	115	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	116	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	121	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	117	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3576257)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	117	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	122	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	125	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	126	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	123	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	123	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	121	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	128	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	124	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	122	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3576257)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	114	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	116	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	115	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	112	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	121	57.6	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3576257) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	116	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	126	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3576257)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	117	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	111	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	122	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	120	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572777)							
EP2102836-001	0089_PW329_210316	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572779)							
EP2102836-008	0089_SW154_210316	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3572778)							
EP2102836-001	0089_PW329_210316	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3572780)							
EP2102836-008	0089_SW154_210316	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3575126)							
EP2102833-022	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	90.7	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3578688)							
EP2102837-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	114	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102836**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 26-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 14
Order number	: DEF19009/730	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102836--001	0089_PW329_210316	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102836--008	0089_SW154_210316	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102836--001	0089_PW329_210316	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102836--008	0089_SW154_210316	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_PW329_210316,	0089_QC110_210316,	----	----	----	23-Mar-2021	16-Mar-2021	**7**
0089_SW156_210316,	0089_QC111_210316,						
0089_MW149_210316,	0089_PW358_210316,						
0089_QC113_210316,	0089_SW154_210316,						
0089_PW330_210316,	0089_PW357_210316,						
0089_SW152_210316,	0089_SW150_210316,						
0089_PW331_210316,	0089_PW356_210316						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	17	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_PW329_210316,	0089_QC110_210316,	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	16-Mar-2021	×
0089_SW156_210316,	0089_QC111_210316,							
0089_MW149_210316,	0089_PW358_210316,							
0089_QC113_210316,	0089_SW154_210316,							
0089_PW330_210316,	0089_PW357_210316,							
0089_SW152_210316,	0089_SW150_210316,							
0089_PW331_210316,	0089_PW356_210316							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_PW329_210316,	0089_QC110_210316,	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	23-Mar-2021	✓
0089_SW156_210316,	0089_QC111_210316,							
0089_MW149_210316,	0089_PW358_210316,							
0089_QC113_210316,	0089_SW154_210316,							
0089_PW330_210316,	0089_PW357_210316,							
0089_SW152_210316,	0089_SW150_210316,							
0089_PW331_210316,	0089_PW356_210316							
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
0089_PW329_210316,	0089_QC110_210316,	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	23-Mar-2021	✓
0089_SW156_210316,	0089_QC111_210316,							
0089_MW149_210316,	0089_PW358_210316,							
0089_QC113_210316,	0089_SW154_210316,							
0089_PW330_210316,	0089_PW357_210316,							
0089_SW152_210316,	0089_SW150_210316,							
0089_PW331_210316,	0089_PW356_210316							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_PW329_210316, 0089_QC110_210316, 0089_SW156_210316, 0089_QC111_210316, 0089_MW149_210316, 0089_PW358_210316, 0089_QC113_210316, 0089_SW154_210316, 0089_PW330_210316, 0089_PW357_210316, 0089_SW152_210316, 0089_SW150_210316, 0089_PW331_210316, 0089_PW356_210316	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	30-Mar-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_PW329_210316, 0089_QC110_210316, 0089_SW156_210316, 0089_QC111_210316, 0089_MW149_210316, 0089_PW358_210316, 0089_QC113_210316, 0089_SW154_210316, 0089_PW330_210316, 0089_PW357_210316, 0089_SW152_210316, 0089_SW150_210316, 0089_PW331_210316, 0089_PW356_210316	**16-Mar-2021**	**----**	----	----	**26-Mar-2021**	13-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW329_210316, 0089_QC110_210316, 0089_SW156_210316, 0089_QC111_210316, 0089_MW149_210316, 0089_PW358_210316, 0089_QC113_210316, 0089_SW154_210316, 0089_PW330_210316, 0089_PW357_210316, 0089_SW152_210316, 0089_SW150_210316, 0089_PW331_210316, 0089_PW356_210316	**16-Mar-2021**	**----**	----	----	**26-Mar-2021**	13-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_PW329_210316, 0089_QC110_210316, 0089_SW156_210316, 0089_QC111_210316, 0089_MW149_210316, 0089_PW358_210316, 0089_QC113_210316, 0089_SW154_210316, 0089_PW330_210316, 0089_PW357_210316, 0089_SW152_210316, 0089_SW150_210316, 0089_PW331_210316, 0089_PW356_210316	**16-Mar-2021**	**----**	----	----	**19-Mar-2021**	23-Mar-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW329_210316, 0089_QC110_210316, 0089_SW156_210316, 0089_QC111_210316, 0089_MW149_210316, 0089_PW358_210316, 0089_QC113_210316, 0089_SW154_210316, 0089_PW330_210316, 0089_PW357_210316, 0089_SW152_210316, 0089_SW150_210316, 0089_PW331_210316	**16-Mar-2021**	**----**	----	----	**19-Mar-2021**	13-Apr-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW356_210316	**16-Mar-2021**	**----**	----	----	**22-Mar-2021**	13-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW329_210316, 0089_QC110_210316, 0089_SW156_210316, 0089_QC111_210316, 0089_MW149_210316, 0089_PW358_210316, 0089_QC113_210316, 0089_SW154_210316, 0089_PW330_210316, 0089_PW357_210316, 0089_SW152_210316, 0089_SW150_210316, 0089_PW331_210316, 0089_PW356_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW329_210316, 0089_QC110_210316, 0089_SW156_210316, 0089_QC111_210316, 0089_MW149_210316, 0089_PW358_210316, 0089_QC113_210316, 0089_SW154_210316, 0089_PW330_210316, 0089_PW357_210316, 0089_SW152_210316, 0089_SW150_210316, 0089_PW331_210316, 0089_PW356_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW329_210316, 0089_QC110_210316, 0089_SW156_210316, 0089_QC111_210316, 0089_MW149_210316, 0089_PW358_210316, 0089_QC113_210316, 0089_SW154_210316, 0089_PW330_210316, 0089_PW357_210316, 0089_SW152_210316, 0089_SW150_210316, 0089_PW331_210316, 0089_PW356_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW329_210316, 0089_QC110_210316, 0089_SW156_210316, 0089_QC111_210316, 0089_MW149_210316, 0089_PW358_210316, 0089_QC113_210316, 0089_SW154_210316, 0089_PW330_210316, 0089_PW357_210316, 0089_SW152_210316, 0089_SW150_210316, 0089_PW331_210316, 0089_PW356_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW329_210316, 0089_QC110_210316, 0089_SW156_210316, 0089_QC111_210316, 0089_MW149_210316, 0089_PW358_210316, 0089_QC113_210316, 0089_SW154_210316, 0089_PW330_210316, 0089_PW357_210316, 0089_SW152_210316, 0089_SW150_210316, 0089_PW331_210316, 0089_PW356_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	17	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	23	**13.04**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	27	**14.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	23	**17.39**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	23	**8.70**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	17	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102836**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20313	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 17-Mar-2021 08:00	Issue Date	: 17-Mar-2021
Client Requested Due Date	: 26-Mar-2021	Scheduled Reporting Date	: **26-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 13.4 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 14 / 14

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102836-001	16-Mar-2021 09:22	0089_PW329_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-002	16-Mar-2021 09:24	0089_QC110_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-003	16-Mar-2021 09:30	0089_SW156_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-004	16-Mar-2021 09:33	0089_QC111_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-005	16-Mar-2021 09:39	0089_MW149_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-006	16-Mar-2021 09:55	0089_PW358_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-007	16-Mar-2021 09:57	0089_QC113_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-008	16-Mar-2021 10:04	0089_SW154_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-009	16-Mar-2021 10:25	0089_PW330_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-010	16-Mar-2021 10:38	0089_PW357_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-011	16-Mar-2021 10:40	0089_SW152_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-012	16-Mar-2021 10:42	0089_SW150_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-013	16-Mar-2021 11:17	0089_PW331_210316	✓	✓	✓	✓	✓	✓	✓
EP2102836-014	16-Mar-2021 11:21	0089_PW356_210316	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102836-001	16-Mar-2021 09:22	0089_PW329_210316	✓
EP2102836-002	16-Mar-2021 09:24	0089_QC110_210316	✓
EP2102836-003	16-Mar-2021 09:30	0089_SW156_210316	✓
EP2102836-004	16-Mar-2021 09:33	0089_QC111_210316	✓
EP2102836-005	16-Mar-2021 09:39	0089_MW149_210316	✓
EP2102836-006	16-Mar-2021 09:55	0089_PW358_210316	✓
EP2102836-007	16-Mar-2021 09:57	0089_QC113_210316	✓
EP2102836-008	16-Mar-2021 10:04	0089_SW154_210316	✓
EP2102836-009	16-Mar-2021 10:25	0089_PW330_210316	✓
EP2102836-010	16-Mar-2021 10:38	0089_PW357_210316	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102836-011	16-Mar-2021 10:40	0089_SW152_210316	✓
EP2102836-012	16-Mar-2021 10:42	0089_SW150_210316	✓
EP2102836-013	16-Mar-2021 11:17	0089_PW331_210316	✓
EP2102836-014	16-Mar-2021 11:21	0089_PW356_210316	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
0089_MW149_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_PW329_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_PW330_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_PW331_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_PW356_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_PW357_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_PW358_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_QC110_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_QC111_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_QC113_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_SW150_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_SW152_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_SW154_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_SW156_21031	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

COC#: 20313 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 17/3 8am	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW329		16/03/2021 09:22 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_QC110		16/03/2021 09:24 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_SW156		16/03/2021 09:30 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_QC111		16/03/2021 09:33 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_MW149		16/03/2021 09:39 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_PW358		16/03/2021 09:55 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_QC113		16/03/2021 09:57 AM	Water	ALS: 3 Non ALS: 1	No	Partial 7/8	X		
008	0089_SW154		16/03/2021 10:04 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_PW330		16/03/2021 10:25 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2102836

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: **20313** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_PW357		16/03/2021 10:38 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
011	0089_SW152		16/03/2021 10:40 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
012	0089_SW150		16/03/2021 10:42 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
013	0089_PW331		16/03/2021 11:17 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
014	0089_PW356		16/03/2021 11:21 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

ALS COC#: 20313 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW329	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_QC110	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_SW156	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_QC111	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW149	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **20313** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW358	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_QC113	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_SW154	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_PW330	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_PW357	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_SW152	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **20313** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

012	0089_SW150	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
013	0089_PW331	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
014	0089_PW356	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: 20313 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW329	Clear Plastic Bottle - Natural	250 mL	00070719175647	Green	No	
001	0089_PW329	HDPE (no PTFE)	20 mL	00352010071633	Grey	No	
001	0089_PW329	HDPE (no PTFE)	20 mL	00352010071547	Grey	No	
001	0089_PW329	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049494	Purple	No	
002	0089_QC110	HDPE (no PTFE)	20 mL	00352010071170	Grey	No	
002	0089_QC110	HDPE (no PTFE)	20 mL	00352010071673	Grey	No	
002	0089_QC110	Clear Plastic Bottle - Natural	250 mL	00070719175515	Green	No	
002	0089_QC110	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049542	Purple	No	
003	0089_SW156	HDPE (no PTFE)	20 mL	00352010071350	Grey	No	
003	0089_SW156	HDPE (no PTFE)	20 mL	00352010071558	Grey	No	
003	0089_SW156	Clear Plastic Bottle - Natural	250 mL	00070719175661	Green	No	
003	0089_SW156	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049513	Purple	No	
004	0089_QC111	HDPE (no PTFE)	20 mL	00352010071172	Grey	No	
004	0089_QC111	HDPE (no PTFE)	20 mL	00352010071175	Grey	No	
004	0089_QC111	Clear Plastic Bottle - Natural	250 mL	00070719175653	Green	No	
004	0089_QC111	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049486	Purple	No	
005	0089_MW149	HDPE (no PTFE)	20 mL	00352010071607	Grey	No	
005	0089_MW149	HDPE (no PTFE)	20 mL	00352010071142	Grey	No	
005	0089_MW149	Clear Plastic Bottle - Natural	250 mL	00070719175521	Green	No	
005	0089_MW149	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049474	Purple	No	
006	0089_PW358	Clear Plastic Bottle - Natural	250 mL	00070719175539	Green	No	
006	0089_PW358	HDPE (no PTFE)	20 mL	00352010071661	Grey	No	
006	0089_PW358	HDPE (no PTFE)	20 mL	00352010071436	Grey	No	
006	0089_PW358	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049465	Purple	No	
007	0089_QC113	Clear Plastic Bottle - Natural	250 mL	00070719175508	Green	No	
007	0089_QC113	HDPE (no PTFE)	20 mL	00352010071508	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 20313 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_QC113	HDPE (no PTFE)	20 mL	00352010071126	Grey	No	
008	0089_SW154	Clear Plastic Bottle - Natural	250 mL	00070719175553	Green	No	
008	0089_SW154	HDPE (no PTFE)	20 mL	00352010071255	Grey	No	
008	0089_SW154	HDPE (no PTFE)	20 mL	00352010071597	Grey	No	
008	0089_SW154	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049512	Purple	No	
009	0089_PW330	HDPE (no PTFE)	20 mL	00352010071183	Grey	No	
009	0089_PW330	HDPE (no PTFE)	20 mL	00352010071700	Grey	No	
009	0089_PW330	Clear Plastic Bottle - Natural	250 mL	00070719175531	Green	No	
009	0089_PW330	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049436	Purple	No	
010	0089_PW357	Clear Plastic Bottle - Natural	250 mL	00070719175506	Green	No	
010	0089_PW357	HDPE (no PTFE)	20 mL	00352010071332	Grey	No	
010	0089_PW357	HDPE (no PTFE)	20 mL	00352010071304	Grey	No	
010	0089_PW357	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001509	Purple	No	
011	0089_SW152	Clear Plastic Bottle - Natural	250 mL	00070719175546	Green	No	
011	0089_SW152	HDPE (no PTFE)	20 mL	00352010071107	Grey	No	
011	0089_SW152	HDPE (no PTFE)	20 mL	00352010071533	Grey	No	
011	0089_SW152	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049485	Purple	No	
012	0089_SW150	HDPE (no PTFE)	20 mL	00352010071446	Grey	No	
012	0089_SW150	HDPE (no PTFE)	20 mL	00352010071131	Grey	No	
012	0089_SW150	Clear Plastic Bottle - Natural	250 mL	00070719175487	Green	No	
012	0089_SW150	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049507	Purple	No	
013	0089_PW331	Clear Plastic Bottle - Natural	250 mL	00070719175679	Green	No	
013	0089_PW331	HDPE (no PTFE)	20 mL	00352010071412	Grey	No	
013	0089_PW331	HDPE (no PTFE)	20 mL	00352010071609	Grey	No	
013	0089_PW331	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049501	Purple	No	
014	0089_PW356	HDPE (no PTFE)	20 mL	00352010071500	Grey	No	
014	0089_PW356	HDPE (no PTFE)	20 mL	00352010071589	Grey	No	

CHAIN OF CUSTODY

ALS COC#: **20313** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

014	0089_PW356	Clear Plastic Bottle - Natural	250 mL	00070719175551	Green	No	
014	0089_PW356	HDPE (no PTFE)	20 mL	00352010071430	Grey	No	
014	0089_PW356	HDPE (no PTFE)	20 mL	00352010071622	Grey	No	
014	0089_PW356	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049503	Purple	No	

Total Bottle Count: ALS: 57, Non ALS: 1

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102837**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021 08:00
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20311	Issue Date	: 26-Mar-2021 12:41
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW139_210316	0089_MW272_210316	0089_MW142_210316	0089_MW137_210316	0089_MW141_210316
				Sampling date / time	16-Mar-2021 09:05	16-Mar-2021 10:15	16-Mar-2021 10:51	16-Mar-2021 11:00	16-Mar-2021 11:49
					EP2102837-001	EP2102837-002	EP2102837-003	EP2102837-004	EP2102837-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**8.01**	**7.68**	**7.62**	**7.68**	**7.51**
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**4340**	**43400**	**27100**	**39100**	**23800**
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**11**	**96**	**155**	**522**	**541**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**272**	**271**	**303**	**251**	**340**
Total Alkalinity as CaCO3	----	1	mg/L		**272**	**271**	**303**	**251**	**340**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**210**	**2990**	**1870**	**2800**	**1630**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**2180**	**20600**	**12600**	**18400**	**11400**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**165**	**592**	**445**	**566**	**432**
Magnesium	7439-95-4	1	mg/L		**161**	**1680**	**1070**	**1550**	**907**
Sodium	7440-23-5	1	mg/L		**1120**	**13100**	**7990**	**12100**	**6860**
Potassium	7440-09-7	1	mg/L		**63**	**736**	**420**	**676**	**363**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**71.3**	**649**	**400**	**582**	**362**
ø Total Cations	----	0.01	meq/L		**71.8**	**756**	**468**	**699**	**404**
ø Ionic Balance	----	0.01	%		**0.36**	**7.66**	**7.84**	**9.13**	**5.42**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**3**	**4**	**15**	**5**	**7**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	**0.06**	<0.02	**0.43**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	**0.13**	<0.02	**0.79**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	**3.70**	<0.02	**8.10**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	**0.11**	<0.02	**1.06**

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW139_210316	0089_MW272_210316	0089_MW142_210316	0089_MW137_210316	0089_MW141_210316
				Sampling date / time	16-Mar-2021 09:05	16-Mar-2021 10:15	16-Mar-2021 10:51	16-Mar-2021 11:00	16-Mar-2021 11:49
					EP2102837-001	EP2102837-002	EP2102837-003	EP2102837-004	EP2102837-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**3.13**	<0.01	**31.0**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	**0.2**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	**0.15**	<0.02	**0.69**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**1.49**	<0.02	**5.86**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**0.04**	<0.02	**0.23**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.22**	<0.01	**0.78**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW139_210316	0089_MW272_210316	0089_MW142_210316	0089_MW137_210316	0089_MW141_210316
				Sampling date / time	16-Mar-2021 09:05	16-Mar-2021 10:15	16-Mar-2021 10:51	16-Mar-2021 11:00	16-Mar-2021 11:49
					EP2102837-001	EP2102837-002	EP2102837-003	EP2102837-004	EP2102837-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**9.03**	<0.01	**49.1**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**6.83**	<0.01	**39.1**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**8.79**	<0.01	**47.3**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**93.7**	**98.9**	**91.2**	**93.5**	**90.8**
13C8-PFOA	----	0.02	%		**89.0**	**90.3**	**86.8**	**87.1**	**89.0**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW289_210316	0089_MW203_210316	0089_MW268_210316	0089_QC116_210316	0089_MW269_210316
				Sampling date / time	16-Mar-2021 12:50	16-Mar-2021 13:23	16-Mar-2021 13:34	16-Mar-2021 13:36	16-Mar-2021 13:48
Compound	CAS Number	LOR	Unit		EP2102837-006	EP2102837-007	EP2102837-008	EP2102837-009	EP2102837-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.99	7.99	7.92	7.97	8.07
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		516	552	7250	9330	1280
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		58	194	72	110	44
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		318	345	421	399	464
Total Alkalinity as CaCO3	----	1	mg/L		318	345	421	399	464
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		58	66	730	772	101
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		41	44	3270	4220	444
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		109	80	206	222	88
Magnesium	7439-95-4	1	mg/L		24	47	292	326	82
Sodium	7440-23-5	1	mg/L		51	56	1890	2400	309
Potassium	7440-09-7	1	mg/L		5	7	116	121	22
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		8.72	9.51	116	143	23.9
ø Total Cations	----	0.01	meq/L		9.76	10.5	119	145	25.1
ø Ionic Balance	----	0.01	%		5.64	4.84	1.54	0.80	2.54
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		5	4	16	11	22
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	0.05	0.04	0.06
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.02	0.06	0.05	0.10
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.17	<0.02	0.30	0.26	0.59
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW289_210316	0089_MW203_210316	0089_MW268_210316	0089_QC116_210316	0089_MW269_210316
				Sampling date / time	16-Mar-2021 12:50	16-Mar-2021 13:23	16-Mar-2021 13:34	16-Mar-2021 13:36	16-Mar-2021 13:48
Compound	CAS Number	LOR	Unit		EP2102837-006	EP2102837-007	EP2102837-008	EP2102837-009	EP2102837-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.80**	<0.01	<0.01	<0.01	**0.48**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.03**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.05**	**0.03**	**0.12**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.01**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW289_210316	0089_MW203_210316	0089_MW268_210316	0089_QC116_210316	0089_MW269_210316
				Sampling date / time	16-Mar-2021 12:50	16-Mar-2021 13:23	16-Mar-2021 13:34	16-Mar-2021 13:36	16-Mar-2021 13:48
Compound	CAS Number	LOR	Unit		EP2102837-006	EP2102837-007	EP2102837-008	EP2102837-009	EP2102837-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.97**	**0.02**	**0.46**	**0.38**	**1.39**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.97**	<0.01	**0.30**	**0.26**	**1.07**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.97**	<0.01	**0.40**	**0.33**	**1.29**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**93.8**	**97.4**	**93.9**	**96.0**	**83.8**
13C8-PFOA	----	0.02	%		**88.2**	**92.0**	**86.8**	**89.5**	**93.2**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102837**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20311	Issue Date	: 26-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3580474)									
EP2102834-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.58	7.59	0.132	0% - 20%
EP2102836-010	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.75	7.74	0.129	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3580476)									
EP2102837-006	0089_MW289_210316	EA005-P: pH Value	----	0.01	pH Unit	7.99	7.98	0.125	0% - 20%
EP2102951-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.92	7.95	0.378	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3579778)									
EP2102837-001	0089_MW139_210316	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	4340	4200	3.28	0% - 20%
EP2102837-009	0089_QC116_210316	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	9330	9340	0.0214	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3579779)									
EP2102837-001	0089_MW139_210316	EA025H: Suspended Solids (SS)	----	5	mg/L	11	15	30.8	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3580473)									
EP2102834-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	277	279	0.561	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	277	279	0.561	0% - 20%
EP2102836-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	142	143	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	142	143	0.00	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3580475)									
EP2102837-006	0089_MW289_210316	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	318	318	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	318	318	0.00	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3580475) - continued									
EP2102951-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	204	204	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	204	204	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3572774)									
EP2102837-001	0089_MW139_210316	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	210	215	2.74	0% - 20%
EP2102892-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2960	2900	1.82	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3572775)									
EP2102837-001	0089_MW139_210316	ED045G: Chloride	16887-00-6	1	mg/L	2180	2150	1.43	0% - 20%
EP2102892-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	20200	19600	2.58	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3571346)									
EP2102836-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	517	529	2.20	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1620	1660	2.18	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12600	13000	2.40	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	689	711	3.16	0% - 20%
EP2102836-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	515	517	0.428	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1620	1640	0.842	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12600	12800	0.971	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	690	702	1.77	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3571347)									
EP2102837-007	0089_MW203_210316	ED093F: Calcium	7440-70-2	1	mg/L	80	84	5.15	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	47	49	3.02	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	56	56	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	7	7	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3578688)									
EP2102836-014	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	4	0.00	No Limit
EP2102837-010	0089_MW269_210316	EP005: Total Organic Carbon	----	1	mg/L	22	26	16.6	0% - 50%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3580474)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3580476)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3579778)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114
				<10	1000 mg/L	103	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3579779)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	109	89.1	120
				<5	1000 mg/L	106	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3580473)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	88.7	81.2	126
				<1	200 mg/L	92.4	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3580475)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	87.4	81.2	126
				<1	200 mg/L	93.8	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572774)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	107	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3572775)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.4	87.9	114
				<1	1000 mg/L	97.4	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3571346)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.8	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.4	88.0	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3571346) - continued								
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.9	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.4	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3571347)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.3	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.5	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3578688)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	113	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3576736)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	117	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	110	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	117	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	110	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3579346)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	117	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	116	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	121	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	119	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3576736)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	108	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	117	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	113	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	119	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	112	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	101	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3579346)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	112	73.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3579346) - continued								
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	114	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	128	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	127	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	130	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	125	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	122	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	114	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	118	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3576736)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	104	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	97.4	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	106	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	102	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	118	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	104	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3579346)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	128	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	119	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	118	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	124	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	124	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	125	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	121	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3576736)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	116	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	120	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	114	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	102	71.4	144

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3579346)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	124	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	126	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	123	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	114	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572774)							
EP2102837-001	0089_MW139_210316	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	115	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3572775)							
EP2102837-001	0089_MW139_210316	ED045G: Chloride	16887-00-6	1000 mg/L	124	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3578688)							
EP2102837-001	0089_MW139_210316	EP005: Total Organic Carbon	----	100 mg/L	114	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102837**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 26-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 10
Order number	: DEF19009/730	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316, 0089_MW269_210316	----	----	----	23-Mar-2021	16-Mar-2021	**7**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	27	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	27	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316, 0089_MW269_210316	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	16-Mar-2021	✘

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316, 0089_MW269_210316	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	23-Mar-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316, 0089_MW269_210316	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	23-Mar-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316, 0089_MW269_210316	**16-Mar-2021**	**----**	----	----	**23-Mar-2021**	30-Mar-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316, 0089_MW269_210316	**16-Mar-2021**	**----**	----	----	**26-Mar-2021**	13-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316, 0089_MW269_210316	**16-Mar-2021**	**----**	----	----	**26-Mar-2021**	13-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316, 0089_MW269_210316	**16-Mar-2021**	**----**	----	----	**19-Mar-2021**	23-Mar-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316, 0089_MW269_210316	**16-Mar-2021**	**----**	----	----	**22-Mar-2021**	13-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_MW269_210316	**16-Mar-2021**	**23-Mar-2021**	12-Sep-2021	✓	**24-Mar-2021**	12-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_MW269_210316	**16-Mar-2021**	**23-Mar-2021**	12-Sep-2021	✓	**24-Mar-2021**	12-Sep-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_MW269_210316	**16-Mar-2021**	**23-Mar-2021**	12-Sep-2021	✓	**24-Mar-2021**	12-Sep-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_MW269_210316	**16-Mar-2021**	**23-Mar-2021**	12-Sep-2021	✓	**24-Mar-2021**	12-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW139_210316, 0089_MW272_210316, 0089_MW142_210316, 0089_MW137_210316, 0089_MW141_210316, 0089_MW289_210316, 0089_MW203_210316, 0089_MW268_210316, 0089_QC116_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	12-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_MW269_210316	**16-Mar-2021**	**23-Mar-2021**	12-Sep-2021	✓	**24-Mar-2021**	12-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	30	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	27	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	10	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	27	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102837**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20311	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 17-Mar-2021 08:00	Issue Date	: 17-Mar-2021
Client Requested Due Date	: 26-Mar-2021	Scheduled Reporting Date	: **26-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 13.4 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 10 / 10

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102837-001	16-Mar-2021 09:05	0089_MW139_210316	✓	✓	✓	✓	✓	✓	✓
EP2102837-002	16-Mar-2021 10:15	0089_MW272_210316	✓	✓	✓	✓	✓	✓	✓
EP2102837-003	16-Mar-2021 10:51	0089_MW142_210316	✓	✓	✓	✓	✓	✓	✓
EP2102837-004	16-Mar-2021 11:00	0089_MW137_210316	✓	✓	✓	✓	✓	✓	✓
EP2102837-005	16-Mar-2021 11:49	0089_MW141_210316	✓	✓	✓	✓	✓	✓	✓
EP2102837-006	16-Mar-2021 12:50	0089_MW289_210316	✓	✓	✓	✓	✓	✓	✓
EP2102837-007	16-Mar-2021 13:23	0089_MW203_210316	✓	✓	✓	✓	✓	✓	✓
EP2102837-008	16-Mar-2021 13:34	0089_MW268_210316	✓	✓	✓	✓	✓	✓	✓
EP2102837-009	16-Mar-2021 13:36	0089_QC116_210316	✓	✓	✓	✓	✓	✓	✓
EP2102837-010	16-Mar-2021 13:48	0089_MW269_210316	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102837-001	16-Mar-2021 09:05	0089_MW139_210316	✓
EP2102837-002	16-Mar-2021 10:15	0089_MW272_210316	✓
EP2102837-003	16-Mar-2021 10:51	0089_MW142_210316	✓
EP2102837-004	16-Mar-2021 11:00	0089_MW137_210316	✓
EP2102837-005	16-Mar-2021 11:49	0089_MW141_210316	✓
EP2102837-006	16-Mar-2021 12:50	0089_MW289_210316	✓
EP2102837-007	16-Mar-2021 13:23	0089_MW203_210316	✓
EP2102837-008	16-Mar-2021 13:34	0089_MW268_210316	✓
EP2102837-009	16-Mar-2021 13:36	0089_QC116_210316	✓
EP2102837-010	16-Mar-2021 13:48	0089_MW269_210316	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
0089_MW137_210310	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW139_210310	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW141_210310	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW142_210310	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW203_210310	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW268_210310	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW269_210310	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW272_210310	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_MW289_210310	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----
0089_QC116_210316	Clear Plastic Bottle - Natural	----	16-Mar-2021	17-Mar-2021	×	----	----

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 20311 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	[redacted] BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/3 8am	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW139		16/03/2021 09:05 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW272		16/03/2021 10:15 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW142		16/03/2021 10:51 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_MW137		16/03/2021 11:00 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_MW141		16/03/2021 11:49 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_MW289		16/03/2021 12:50 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_MW203		16/03/2021 01:23 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_MW268		16/03/2021 01:34 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_QC116		16/03/2021 01:36 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2102837

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: **20311** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW269		16/03/2021 01:48 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

(ALS) COC#: 20311 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW139	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW272	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW142	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW137	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW141	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **20311** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW289	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW203	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW268	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_QC116	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_MW269	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **20311** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW139	Clear Plastic Bottle - Natural	250 mL	00070719175526	Green	No	
001	0089_MW139	HDPE (no PTFE)	20 mL	00352010071128	Grey	No	
001	0089_MW139	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049516	Purple	No	
001	0089_MW139	HDPE (no PTFE)	20 mL	00352010071147	Grey	No	
002	0089_MW272	HDPE (no PTFE)	20 mL	00352010071250	Grey	No	
002	0089_MW272	HDPE (no PTFE)	20 mL	00352010071238	Grey	No	
002	0089_MW272	Clear Plastic Bottle - Natural	250 mL	00070719175549	Green	No	
002	0089_MW272	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049524	Purple	No	
003	0089_MW142	HDPE (no PTFE)	20 mL	00352010071470	Grey	No	
003	0089_MW142	HDPE (no PTFE)	20 mL	00352010071320	Grey	No	
003	0089_MW142	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049489	Purple	No	
003	0089_MW142	Clear Plastic Bottle - Natural	250 mL	00070719175543	Green	No	
004	0089_MW137	HDPE (no PTFE)	20 mL	00352010071658	Grey	No	
004	0089_MW137	Clear Plastic Bottle - Natural	250 mL	00070719175670	Green	No	
004	0089_MW137	HDPE (no PTFE)	20 mL	00352010071667	Grey	No	
004	0089_MW137	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049422	Purple	No	
005	0089_MW141	Clear Plastic Bottle - Natural	250 mL	00070719175537	Green	No	
005	0089_MW141	HDPE (no PTFE)	20 mL	00352010071694	Grey	No	
005	0089_MW141	HDPE (no PTFE)	20 mL	00352010071214	Grey	No	
005	0089_MW141	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049470	Purple	No	
006	0089_MW289	Clear Plastic Bottle - Natural	250 mL	00070719175535	Green	No	
006	0089_MW289	HDPE (no PTFE)	20 mL	00352010071202	Grey	No	
006	0089_MW289	HDPE (no PTFE)	20 mL	00352010071534	Grey	No	
006	0089_MW289	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049553	Purple	No	
007	0089_MW203	Clear Plastic Bottle - Natural	250 mL	00070719175579	Green	No	
007	0089_MW203	HDPE (no PTFE)	20 mL	00352010071650	Grey	No	

CHAIN OF CUSTODY

ALS COC#: **20311** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_MW203	HDPE (no PTFE)	20 mL	00352010071553	Grey	No	
007	0089_MW203	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049280	Purple	No	
008	0089_MW268	HDPE (no PTFE)	20 mL	00352010071215	Grey	No	
008	0089_MW268	HDPE (no PTFE)	20 mL	00352010071690	Grey	No	
008	0089_MW268	Clear Plastic Bottle - Natural	250 mL	00070719175529	Green	No	
008	0089_MW268	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049555	Purple	No	
009	0089_QC116	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049445	Purple	No	
009	0089_QC116	Clear Plastic Bottle - Natural	250 mL	00070719175545	Green	No	
009	0089_QC116	HDPE (no PTFE)	20 mL	00352010071687	Grey	No	
009	0089_QC116	HDPE (no PTFE)	20 mL	00352010071261	Grey	No	
010	0089_MW269	Clear Plastic Bottle - Natural	250 mL	00070719175651	Green	No	
010	0089_MW269	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049511	Purple	No	
010	0089_MW269	HDPE (no PTFE)	20 mL	00352010071381	Grey	No	
010	0089_MW269	HDPE (no PTFE)	20 mL	00352010071116	Grey	No	

Total Bottle Count: ALS: 40, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102838**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021 08:00
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Mar-2021
C-O-C number	: 20314	Issue Date	: 24-Mar-2021 12:24
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD329_210316	0089_SD358_210316	0089_SD330_210316	0089_SD357_210316	0089_SD331_210316
				Sampling date / time	16-Mar-2021 09:29	16-Mar-2021 10:00	16-Mar-2021 10:30	16-Mar-2021 10:36	16-Mar-2021 11:19
					EP2102838-001	EP2102838-002	EP2102838-003	EP2102838-004	EP2102838-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**8.7**	**8.6**	**9.0**	**8.9**	**8.9**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**3400**	**3890**	**3340**	**3580**	**3470**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**22.6**	**26.5**	**23.9**	**27.1**	**24.6**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**3.8**	**4.2**	**4.1**	**4.0**	**4.0**
Exchangeable Magnesium	----	0.1	meq/100g		**0.5**	**0.5**	**0.6**	**0.5**	**0.5**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
Cation Exchange Capacity	----	0.1	meq/100g		**4.4**	**4.8**	**4.9**	**4.7**	**4.6**
Exchangeable Sodium Percent	----	0.1	%		**2.5**	**2.4**	**2.7**	**2.6**	**2.6**
EP004: Organic Matter									
Organic Matter	----	0.5	%		<0.5	<0.5	<0.5	<0.5	<0.5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD329_210316	0089_SD358_210316	0089_SD330_210316	0089_SD357_210316	0089_SD331_210316
				Sampling date / time	16-Mar-2021 09:29	16-Mar-2021 10:00	16-Mar-2021 10:30	16-Mar-2021 10:36	16-Mar-2021 11:19
Compound	CAS Number	LOR	Unit		EP2102838-001	EP2102838-002	EP2102838-003	EP2102838-004	EP2102838-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD329_210316	0089_SD358_210316	0089_SD330_210316	0089_SD357_210316	0089_SD331_210316
				Sampling date / time	16-Mar-2021 09:29	16-Mar-2021 10:00	16-Mar-2021 10:30	16-Mar-2021 10:36	16-Mar-2021 11:19
Compound	CAS Number	LOR	Unit		EP2102838-001	EP2102838-002	EP2102838-003	EP2102838-004	EP2102838-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**96.5**	**99.5**	**84.5**	**95.0**	**97.5**
13C8-PFOA	----	0.0002	%		**104**	**102**	**99.0**	**104**	**98.0**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD356_210316	----	----	----	----
			Sampling date / time	16-Mar-2021 11:20	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2102838-006	--------	--------	--------	--------
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**8.9**	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**3280**	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**23.0**	----	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**2.4**	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.3**	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**2.8**	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**2.5**	----	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD356_210316	----	----	----	----
				Sampling date / time	16-Mar-2021 11:20	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102838-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD356_210316	----	----	----	----
				Sampling date / time	16-Mar-2021 11:20	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102838-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**96.0**	----	----	----	----
13C8-PFOA	----	0.0002	%		**102**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102838**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 17-Mar-2021
C-O-C number	: 20314	Issue Date	: 24-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3569143)									
EP2102754-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.6	8.7	1.73	0% - 20%
EP2102757-005	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.8	8.8	0.00	0% - 20%
EA002: pH 1:5 (Soils) (QC Lot: 3569145)									
EP2102838-003	0089_SD330_210316	EA002: pH Value	----	0.1	pH Unit	9.0	9.0	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3569142)									
EP2102754-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3980	3990	0.251	0% - 20%
EP2102757-005	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	2510	2500	0.399	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3569144)									
EP2102838-003	0089_SD330_210316	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3340	3340	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3569158)									
EP2102835-001	Anonymous	EA055: Moisture Content	----	0.1	%	28.6	27.1	5.36	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3569140)									
EP2102835-001	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	3.4	3.4	0.00	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	3.7	3.5	5.42	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.6	0.5	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.1	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	4.5	4.2	6.64	0% - 20%
EP004: Organic Matter (QC Lot: 3569135)									
EP2102835-001	Anonymous	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3578102)									
EP2102835-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3578102) - continued									
EP2102835-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0017	0.0018	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
ES2109924-010	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3578102)									
EP2102835-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
ES2109924-010	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3578102)									
EP2102835-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3578102) - continued									
EP2102835-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES2109924-010	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3578102)									
EP2102835-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES2109924-010	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3569143)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	101	70.0	130
				----	7 pH Unit	99.8	70.0	130
EA002: pH 1:5 (Soils) (QCLot: 3569145)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	70.0	130
				----	7 pH Unit	99.8	70.0	130
EA010: Conductivity (1:5) (QCLot: 3569142)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
EA010: Conductivity (1:5) (QCLot: 3569144)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.8	93.6	106
ED008: Exchangeable Cations (QCLot: 3569140)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	86.7	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	88.4	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	97.3	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	97.5	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	87.4	79.9	110
EP004: Organic Matter (QCLot: 3569135)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	98.7	70.0	120
				<0.5	85 %	85.4	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3578102)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578102)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	89.8	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	69.0	133

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578102) - continued								
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	100	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3578102)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.8	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.8	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3578102)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	104	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	109	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	95.2	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	104	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3578102)							
EP2102835-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	116	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	123	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	109	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	116	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	126	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	112	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578102)							
EP2102835-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	103	71.0	135

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578102) - continued							
EP2102835-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	116	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	118	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	109	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	112	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	110	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	118	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	118	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	112	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	116	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	100	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3578102)							
EP2102835-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	118	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	111	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	100	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	103	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	102	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	112	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	108	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3578102)							
EP2102835-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	120	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	116	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	96.8	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	124	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102838**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 24-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 6
Order number	: DEF19009/730	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002)								
0089_SD329_210316,	0089_SD358_210316,	**16-Mar-2021**	**18-Mar-2021**	23-Mar-2021	✓	**18-Mar-2021**	18-Mar-2021	✓
0089_SD330_210316,	0089_SD357_210316,							
0089_SD331_210316,	0089_SD356_210316							
EA010: Conductivity (1:5)								
Soil Glass Jar - Unpreserved (EA010)								
0089_SD329_210316,	0089_SD358_210316,	**16-Mar-2021**	**18-Mar-2021**	23-Mar-2021	✓	**18-Mar-2021**	15-Apr-2021	✓
0089_SD330_210316,	0089_SD357_210316,							
0089_SD331_210316,	0089_SD356_210316							
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
0089_SD329_210316,	0089_SD358_210316,	**16-Mar-2021**	**----**	----	----	**17-Mar-2021**	30-Mar-2021	✓
0089_SD330_210316,	0089_SD357_210316,							
0089_SD331_210316,	0089_SD356_210316							
ED008: Exchangeable Cations								
Soil Glass Jar - Unpreserved (ED008)								
0089_SD329_210316,	0089_SD358_210316,	**16-Mar-2021**	**22-Mar-2021**	13-Apr-2021	✓	**22-Mar-2021**	13-Apr-2021	✓
0089_SD330_210316,	0089_SD357_210316,							
0089_SD331_210316,	0089_SD356_210316							
EP004: Organic Matter								
Soil Glass Jar - Unpreserved (EP004)								
0089_SD329_210316,	0089_SD358_210316,	**16-Mar-2021**	**23-Mar-2021**	13-Apr-2021	✓	**23-Mar-2021**	13-Apr-2021	✓
0089_SD330_210316,	0089_SD357_210316,							
0089_SD331_210316,	0089_SD356_210316							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0089_SD329_210316,	0089_SD358_210316,	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	01-May-2021	✓
0089_SD330_210316,	0089_SD357_210316,							
0089_SD331_210316,	0089_SD356_210316							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD329_210316, 0089_SD358_210316, 0089_SD330_210316, 0089_SD357_210316, 0089_SD331_210316, 0089_SD356_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	01-May-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD329_210316, 0089_SD358_210316, 0089_SD330_210316, 0089_SD357_210316, 0089_SD331_210316, 0089_SD356_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	01-May-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD329_210316, 0089_SD358_210316, 0089_SD330_210316, 0089_SD357_210316, 0089_SD331_210316, 0089_SD356_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	01-May-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD329_210316, 0089_SD358_210316, 0089_SD330_210316, 0089_SD357_210316, 0089_SD331_210316, 0089_SD356_210316	**16-Mar-2021**	**22-Mar-2021**	12-Sep-2021	✓	**23-Mar-2021**	01-May-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	3	24	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	3	24	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	8	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	4	24	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102838**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20314	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 17-Mar-2021 08:00	Issue Date	: 17-Mar-2021
Client Requested Due Date	: 26-Mar-2021	Scheduled Reporting Date	: **26-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 13.4 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 6 / 6

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2102838-001	16-Mar-2021 09:29	0089_SD329_210316	✓	✓	✓	✓
EP2102838-002	16-Mar-2021 10:00	0089_SD358_210316	✓	✓	✓	✓
EP2102838-003	16-Mar-2021 10:30	0089_SD330_210316	✓	✓	✓	✓
EP2102838-004	16-Mar-2021 10:36	0089_SD357_210316	✓	✓	✓	✓
EP2102838-005	16-Mar-2021 11:19	0089_SD331_210316	✓	✓	✓	✓
EP2102838-006	16-Mar-2021 11:20	0089_SD356_210316	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

(ALS) COC#: **20314** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	[redacted]BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] 17/3 3pm	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD329		16/03/2021 09:29 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD358		16/03/2021 10:00 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD330		16/03/2021 10:30 AM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD357		16/03/2021 10:36 AM	Soil	ALS: 2 Non ALS: 0	No		X		
005	0089_SD331		16/03/2021 11:19 AM	Soil	ALS: 2 Non ALS: 0	No		X		
006	0089_SD356		16/03/2021 11:20 AM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division
Perth
Work Order Reference
EP2102838

Telephone : 61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: **20314** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD329	HDPE Soil Jar	200 mL	00620719085953	Grey	No	
001	0089_SD329	Soil Glass Jar - Unpreserved	150 mL	00261020060143	Orange	No	
002	0089_SD358	Soil Glass Jar - Unpreserved	150 mL	00261020060161	Orange	No	
002	0089_SD358	HDPE Soil Jar	200 mL	00620719085961	Grey	No	
003	0089_SD330	HDPE Soil Jar	200 mL	00620719085959	Grey	No	
003	0089_SD330	Soil Glass Jar - Unpreserved	150 mL	00261020060120	Orange	No	
004	0089_SD357	HDPE Soil Jar	200 mL	00620719085936	Grey	No	
004	0089_SD357	Soil Glass Jar - Unpreserved	150 mL	00261020060061	Orange	No	
005	0089_SD331	Soil Glass Jar - Unpreserved	150 mL	00261020040839	Orange	No	
005	0089_SD331	HDPE Soil Jar	200 mL	00620719085945	Grey	No	
006	0089_SD356	HDPE Soil Jar	200 mL	00620719085950	Grey	No	
006	0089_SD356	Soil Glass Jar - Unpreserved	150 mL	00261020060006	Orange	No	

Total Bottle Count: ALS: 12, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102888**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021 16:10
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20382	Issue Date	: 25-Mar-2021 21:21
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED008: Poor duplicate precision was obtained for Exchangeable Sodium Percent on sample EP2102888-009 due to possible sample heterogeneity. Results have been confirmed by re-extraction and re-analysis.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD350_210317	0089_SD401_210317	0089_SD380_210317	0089_SD351_210317	0089_SD381_210317
			Sampling date / time	17-Mar-2021 10:38	17-Mar-2021 10:39	17-Mar-2021 10:41	17-Mar-2021 10:43	17-Mar-2021 10:44
Compound	CAS Number	LOR	Unit	EP2102888-001	EP2102888-002	EP2102888-003	EP2102888-004	EP2102888-005
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.2**	**9.2**	**9.3**	**9.2**	**9.3**
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**3040**	**3460**	**3310**	**2880**	**3480**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**23.7**	**20.7**	**20.5**	**23.5**	**22.7**
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**11.3**	**4.5**	**6.3**	**4.0**	**2.1**
Exchangeable Magnesium	----	0.1	meq/100g	**1.1**	**0.5**	**0.6**	**0.5**	**0.3**
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**
Cation Exchange Capacity	----	0.1	meq/100g	**12.7**	**5.2**	**7.2**	**4.7**	**2.6**
Exchangeable Sodium Percent	----	0.1	%	**2.0**	**3.5**	**2.8**	**3.7**	**7.0**
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	<0.5	<0.5	<0.5	<0.5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0005**	**0.0004**	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD350_210317	0089_SD401_210317	0089_SD380_210317	0089_SD351_210317	0089_SD381_210317
				Sampling date / time	17-Mar-2021 10:38	17-Mar-2021 10:39	17-Mar-2021 10:41	17-Mar-2021 10:43	17-Mar-2021 10:44
Compound	CAS Number	LOR	Unit		EP2102888-001	EP2102888-002	EP2102888-003	EP2102888-004	EP2102888-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0005**	**0.0004**	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD350_210317	0089_SD401_210317	0089_SD380_210317	0089_SD351_210317	0089_SD381_210317
				Sampling date / time	17-Mar-2021 10:38	17-Mar-2021 10:39	17-Mar-2021 10:41	17-Mar-2021 10:43	17-Mar-2021 10:44
Compound	CAS Number	LOR	Unit		EP2102888-001	EP2102888-002	EP2102888-003	EP2102888-004	EP2102888-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0005**	**0.0004**	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0005**	**0.0004**	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**91.5**	**92.0**	**98.0**	**97.0**	**97.0**
13C8-PFOA	----	0.0002	%		**86.0**	**86.0**	**88.0**	**89.0**	**84.5**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD352_210317	0089_SD308_210317	0089_QC117_210317	0089_SD316_210317	0089_SD307_210317
			Sampling date / time	17-Mar-2021 10:46	17-Mar-2021 12:59	17-Mar-2021 13:01	17-Mar-2021 13:13	17-Mar-2021 13:20
Compound	CAS Number	LOR	Unit	EP2102888-006	EP2102888-007	EP2102888-008	EP2102888-009	EP2102888-010
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.4**	**9.4**	**9.6**	**9.2**	**9.2**
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**2460**	**2350**	**1260**	**3850**	**3300**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**18.2**	**17.1**	**8.0**	**25.5**	**22.4**
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**2.0**	**2.2**	**2.5**	**2.7**	**4.4**
Exchangeable Magnesium	----	0.1	meq/100g	**0.3**	**0.3**	**0.3**	**0.4**	**0.6**
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	**0.1**	**0.1**	**0.2**	**0.1**
Cation Exchange Capacity	----	0.1	meq/100g	**2.5**	**2.7**	**2.9**	**3.2**	**5.1**
Exchangeable Sodium Percent	----	0.1	%	**6.9**	**5.1**	**4.5**	**5.2**	**2.5**
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	<0.5	<0.5	<0.5	<0.5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD352_210317	0089_SD308_210317	0089_QC117_210317	0089_SD316_210317	0089_SD307_210317
				Sampling date / time	17-Mar-2021 10:46	17-Mar-2021 12:59	17-Mar-2021 13:01	17-Mar-2021 13:13	17-Mar-2021 13:20
Compound	CAS Number	LOR	Unit		EP2102888-006	EP2102888-007	EP2102888-008	EP2102888-009	EP2102888-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD352_210317	0089_SD308_210317	0089_QC117_210317	0089_SD316_210317	0089_SD307_210317
				Sampling date / time	17-Mar-2021 10:46	17-Mar-2021 12:59	17-Mar-2021 13:01	17-Mar-2021 13:13	17-Mar-2021 13:20
Compound	CAS Number	LOR	Unit		EP2102888-006	EP2102888-007	EP2102888-008	EP2102888-009	EP2102888-010
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**87.0**	**92.5**	**97.5**	**97.5**	**87.5**
13C8-PFOA	----	0.0002	%		**92.0**	**88.0**	**89.0**	**89.0**	**87.5**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD315_210317	0089_SD314_210317	0089_SD306_210317	----	----
			Sampling date / time	17-Mar-2021 13:38	17-Mar-2021 13:44	17-Mar-2021 13:48	----	----
Compound	CAS Number	LOR	Unit	EP2102888-011	EP2102888-012	EP2102888-013	--------	--------
				Result	Result	Result	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.3**	**9.2**	**9.1**	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**2750**	**2880**	**3490**	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**19.2**	**20.4**	**26.1**	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**3.8**	**3.9**	**1.8**	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.5**	**0.5**	**0.3**	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	**0.1**	<0.1	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**4.4**	**4.5**	**2.2**	----	----
Exchangeable Sodium Percent	----	0.1	%	**3.6**	**2.9**	**4.2**	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	<0.5	<0.5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD315_210317	0089_SD314_210317	0089_SD306_210317	----	----
				Sampling date / time	17-Mar-2021 13:38	17-Mar-2021 13:44	17-Mar-2021 13:48	----	----
Compound	CAS Number	LOR	Unit		EP2102888-011	EP2102888-012	EP2102888-013	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD315_210317	0089_SD314_210317	0089_SD306_210317	----	----
			Sampling date / time	17-Mar-2021 13:38	17-Mar-2021 13:44	17-Mar-2021 13:48	----	----
Compound	CAS Number	LOR	Unit	EP2102888-011	EP2102888-012	EP2102888-013	--------	--------
				Result	Result	Result	----	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**97.0**	**94.0**	**95.5**	----	----
13C8-PFOA	----	0.0002	%	**86.0**	**85.5**	**89.5**	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102888**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20382	Issue Date	: 25-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3573756)									
EP2102888-001	0089_SD350_210317	EA002: pH Value	----	0.1	pH Unit	9.2	9.3	0.00	0% - 20%
EP2102888-010	0089_SD307_210317	EA002: pH Value	----	0.1	pH Unit	9.2	9.3	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3573755)									
EP2102888-001	0089_SD350_210317	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3040	3060	0.656	0% - 20%
EP2102888-010	0089_SD307_210317	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3300	3320	0.604	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3573767)									
EP2102888-001	0089_SD350_210317	EA055: Moisture Content	----	0.1	%	23.7	23.0	3.00	0% - 20%
EP2102888-010	0089_SD307_210317	EA055: Moisture Content	----	0.1	%	22.4	22.6	0.926	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3573751)									
EP2102882-011	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	9.4	9.4	0.00	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	16.1	16.3	1.23	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	1.8	1.9	0.00	0% - 50%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	1.9	1.9	0.00	0% - 50%
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	20.0	20.2	1.05	0% - 20%
EP2102888-009	0089_SD316_210317	ED008: Exchangeable Sodium Percent	----	0.1	%	5.2	# 3.8	30.9	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	2.7	2.8	4.72	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.4	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.1	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	3.2	3.3	0.00	0% - 20%
EP004: Organic Matter (QC Lot: 3573758)									
EP2102888-001	0089_SD350_210317	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit
EP2102888-011	0089_SD315_210317	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3578112)									
EP2102888-001	0089_SD350_210317	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	0.0005	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP2102888-011	0089_SD315_210317	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3578112)									
EP2102888-001	0089_SD350_210317	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP2102888-011	0089_SD315_210317	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3578112)									
EP2102888-001	0089_SD350_210317	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3578112) - continued									
EP2102888-001	0089_SD350_210317	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2102888-011	0089_SD315_210317	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3578112)									
EP2102888-001	0089_SD350_210317	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2102888-011	0089_SD315_210317	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3573756)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3573755)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
ED008: Exchangeable Cations (QCLot: 3573751)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	87.5	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	89.4	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	96.9	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	95.8	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	88.1	79.9	110
EP004: Organic Matter (QCLot: 3573758)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	98.7	70.0	120
				<0.5	85 %	85.4	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3578112)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578112)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	103	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	111	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3578112)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3578112) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	107	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	107	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	108	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	108	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3578112)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	104	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	108	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	121	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	103	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3578112)							
EP2102888-001	0089_SD350_210317	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	113	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	108	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	113	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	106	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	122	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	117	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578112)							
EP2102888-001	0089_SD350_210317	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	105	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	114	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	111	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	113	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	120	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	116	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	119	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578112) - continued							
EP2102888-001	0089_SD350_210317	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	115	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	110	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	118	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	112	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3578112)							
EP2102888-001	0089_SD350_210317	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	114	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	97.8	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	108	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	107	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	111	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	108	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	109	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3578112)							
EP2102888-001	0089_SD350_210317	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	112	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	110	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	106	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	96.8	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102888**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 25-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 13
Order number	: DEF19009/730	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
ED008: Exchangeable Cations	EP2102888--009	0089_SD316_210317	**Exchangeable Sodium Percent**	----	30.9 %	0% - 20%	**RPD exceeds LOR based limits**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD350_210317, 0089_SD401_210317, 0089_SD380_210317, 0089_SD351_210317, 0089_SD381_210317, 0089_SD352_210317, 0089_SD308_210317, 0089_QC117_210317, 0089_SD316_210317, 0089_SD307_210317, 0089_SD315_210317, 0089_SD314_210317, 0089_SD306_210317	**17-Mar-2021**	**19-Mar-2021**	24-Mar-2021	✓	**19-Mar-2021**	19-Mar-2021	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD350_210317, 0089_SD401_210317, 0089_SD380_210317, 0089_SD351_210317, 0089_SD381_210317, 0089_SD352_210317, 0089_SD308_210317, 0089_QC117_210317, 0089_SD316_210317, 0089_SD307_210317, 0089_SD315_210317, 0089_SD314_210317, 0089_SD306_210317	**17-Mar-2021**	**19-Mar-2021**	24-Mar-2021	✓	**19-Mar-2021**	16-Apr-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD350_210317, 0089_SD401_210317, 0089_SD380_210317, 0089_SD351_210317, 0089_SD381_210317, 0089_SD352_210317, 0089_SD308_210317, 0089_QC117_210317, 0089_SD316_210317, 0089_SD307_210317, 0089_SD315_210317, 0089_SD314_210317, 0089_SD306_210317	**17-Mar-2021**	**----**	----	----	**19-Mar-2021**	31-Mar-2021	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD350_210317, 0089_SD401_210317, 0089_SD380_210317, 0089_SD351_210317, 0089_SD381_210317, 0089_SD352_210317, 0089_SD308_210317, 0089_QC117_210317, 0089_SD316_210317, 0089_SD307_210317, 0089_SD315_210317, 0089_SD314_210317, 0089_SD306_210317	**17-Mar-2021**	**24-Mar-2021**	14-Apr-2021	✓	**24-Mar-2021**	14-Apr-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD350_210317, 0089_SD401_210317, 0089_SD380_210317, 0089_SD351_210317, 0089_SD381_210317, 0089_SD352_210317, 0089_SD308_210317, 0089_QC117_210317, 0089_SD316_210317, 0089_SD307_210317, 0089_SD315_210317, 0089_SD314_210317, 0089_SD306_210317	**17-Mar-2021**	**23-Mar-2021**	14-Apr-2021	✓	**23-Mar-2021**	14-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD350_210317, 0089_SD401_210317, 0089_SD380_210317, 0089_SD351_210317, 0089_SD381_210317, 0089_SD352_210317, 0089_SD308_210317, 0089_QC117_210317, 0089_SD316_210317, 0089_SD307_210317, 0089_SD315_210317, 0089_SD314_210317, 0089_SD306_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	01-May-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD350_210317, 0089_SD401_210317, 0089_SD380_210317, 0089_SD351_210317, 0089_SD381_210317, 0089_SD352_210317, 0089_SD308_210317, 0089_QC117_210317, 0089_SD316_210317, 0089_SD307_210317, 0089_SD315_210317, 0089_SD314_210317, 0089_SD306_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	01-May-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD350_210317, 0089_SD401_210317, 0089_SD380_210317, 0089_SD351_210317, 0089_SD381_210317, 0089_SD352_210317, 0089_SD308_210317, 0089_QC117_210317, 0089_SD316_210317, 0089_SD307_210317, 0089_SD315_210317, 0089_SD314_210317, 0089_SD306_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	01-May-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD350_210317, 0089_SD401_210317, 0089_SD380_210317, 0089_SD351_210317, 0089_SD381_210317, 0089_SD352_210317, 0089_SD308_210317, 0089_QC117_210317, 0089_SD316_210317, 0089_SD307_210317, 0089_SD315_210317, 0089_SD314_210317, 0089_SD306_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	01-May-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD350_210317, 0089_SD401_210317, 0089_SD380_210317, 0089_SD351_210317, 0089_SD381_210317, 0089_SD352_210317, 0089_SD308_210317, 0089_QC117_210317, 0089_SD316_210317, 0089_SD307_210317, 0089_SD315_210317, 0089_SD314_210317, 0089_SD306_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	01-May-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102888**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20382	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 17-Mar-2021 16:10	Issue Date	: 18-Mar-2021
Client Requested Due Date	: 29-Mar-2021	Scheduled Reporting Date	: **29-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 18.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2102888-001	17-Mar-2021 10:38	0089_SD350_210317	✓	✓	✓	✓
EP2102888-002	17-Mar-2021 10:39	0089_SD401_210317	✓	✓	✓	✓
EP2102888-003	17-Mar-2021 10:41	0089_SD380_210317	✓	✓	✓	✓
EP2102888-004	17-Mar-2021 10:43	0089_SD351_210317	✓	✓	✓	✓
EP2102888-005	17-Mar-2021 10:44	0089_SD381_210317	✓	✓	✓	✓
EP2102888-006	17-Mar-2021 10:46	0089_SD352_210317	✓	✓	✓	✓
EP2102888-007	17-Mar-2021 12:59	0089_SD308_210317	✓	✓	✓	✓
EP2102888-008	17-Mar-2021 13:01	0089_QC117_210317	✓	✓	✓	✓
EP2102888-009	17-Mar-2021 13:13	0089_SD316_210317	✓	✓	✓	✓
EP2102888-010	17-Mar-2021 13:20	0089_SD307_210317	✓	✓	✓	✓
EP2102888-011	17-Mar-2021 13:38	0089_SD315_210317	✓	✓	✓	✓
EP2102888-012	17-Mar-2021 13:44	0089_SD314_210317	✓	✓	✓	✓
EP2102888-013	17-Mar-2021 13:48	0089_SD306_210317	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 20382 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17.03.2 16:10	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD350		17/03/2021 10:38 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD401		17/03/2021 10:39 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD380		17/03/2021 10:41 AM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD351		17/03/2021 10:43 AM	Soil	ALS: 2 Non ALS: 0	No		X		
005	0089_SD381		17/03/2021 10:44 AM	Soil	ALS: 2 Non ALS: 0	No		X		
006	0089_SD352		17/03/2021 10:46 AM	Soil	ALS: 2 Non ALS: 0	No		X		
007	0089_SD308		17/03/2021 12:59 PM	Soil	ALS: 2 Non ALS: 0	No		X		
008	0089_QC117		17/03/2021 01:01 PM	Soil	ALS: 2 Non ALS: 0	No		X		
009	0089_SD316		17/03/2021 01:13 PM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division Perth

Work Order Reference

EP2102888

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: **20382** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SD307		17/03/2021 01:20 PM	Soil	ALS: 2 Non ALS: 0	No		X		
011	0089_SD315		17/03/2021 01:38 PM	Soil	ALS: 2 Non ALS: 0	No		X		
012	0089_SD314		17/03/2021 01:44 PM	Soil	ALS: 2 Non ALS: 0	No		X		
013	0089_SD306		17/03/2021 01:48 PM	Soil	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

(ALS) COC#: **20382** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD350	HDPE Soil Jar	200 mL	00620719085932	Grey	No	
001	0089_SD350	Soil Glass Jar - Unpreserved	150 mL	00261020040838	Orange	No	
002	0089_SD401	Soil Glass Jar - Unpreserved	150 mL	00261020040785	Orange	No	
002	0089_SD401	HDPE Soil Jar	200 mL	00620719085990	Grey	No	
003	0089_SD380	Soil Glass Jar - Unpreserved	150 mL	00261020060023	Orange	No	
003	0089_SD380	HDPE Soil Jar	200 mL	00620719086001	Grey	No	
004	0089_SD351	HDPE Soil Jar	200 mL	00620719085778	Grey	No	
004	0089_SD351	Soil Glass Jar - Unpreserved	150 mL	00261020060026	Orange	No	
005	0089_SD381	HDPE Soil Jar	200 mL	00620719085979	Grey	No	
005	0089_SD381	Soil Glass Jar - Unpreserved	150 mL	00261020060007	Orange	No	
006	0089_SD352	Soil Glass Jar - Unpreserved	150 mL	00261020060021	Orange	No	
006	0089_SD352	HDPE Soil Jar	200 mL	00620719085954	Grey	No	
007	0089_SD308	HDPE Soil Jar	200 mL	00620719085983	Grey	No	
007	0089_SD308	Soil Glass Jar - Unpreserved	150 mL	00261020060085	Orange	No	
008	0089_QC117	Soil Glass Jar - Unpreserved	150 mL	00261020060024	Orange	No	
008	0089_QC117	HDPE Soil Jar	200 mL	00620719085995	Grey	No	
009	0089_SD316	Soil Glass Jar - Unpreserved	150 mL	00261219120992	Orange	No	
009	0089_SD316	HDPE Soil Jar	200 mL	00621019111890	Grey	No	
010	0089_SD307	HDPE Soil Jar	200 mL	00620719085997	Grey	No	
010	0089_SD307	Soil Glass Jar - Unpreserved	150 mL	00261020040796	Orange	No	
011	0089_SD315	Soil Glass Jar - Unpreserved	150 mL	00261020060155	Orange	No	
011	0089_SD315	HDPE Soil Jar	200 mL	00620719085931	Grey	No	
012	0089_SD314	HDPE Soil Jar	200 mL	00620719085717	Grey	No	
012	0089_SD314	Soil Glass Jar - Unpreserved	150 mL	00261020059978	Orange	No	
013	0089_SD306	HDPE Soil Jar	200 mL	00620719085960	Grey	No	
013	0089_SD306	Soil Glass Jar - Unpreserved	150 mL	00261020060029	Orange	No	

CHAIN OF CUSTODY

COC#: **20382** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	

Other comments:

Total Bottle Count: ALS: 26, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102890**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021 16:10
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20391	Issue Date	: 26-Mar-2021 12:50
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 1		
No. of samples analysed	: 1		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW310_210317	----	----	----	----
				Sampling date / time	17-Mar-2021 13:14	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102890-001	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.03	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		42600	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		18	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		108	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		108	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2730	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19200	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		505	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1580	----	----	----	----
Sodium	7440-23-5	1	mg/L		12400	----	----	----	----
Potassium	7440-09-7	1	mg/L		700	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		601	----	----	----	----
ø Total Cations	----	0.01	meq/L		712	----	----	----	----
ø Ionic Balance	----	0.01	%		8.52	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		1	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW310_210317	----	----	----	----
			Sampling date / time		17-Mar-2021 13:14	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102890-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW310_210317	----	----	----	----
				Sampling date / time	17-Mar-2021 13:14	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102890-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.0**	----	----	----	----
13C8-PFOA	----	0.02	%		**97.8**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102890**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20391	Issue Date	: 26-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 1		
No. of samples analysed	: 1		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3582963)									
EP2102879-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.54	6.56	0.305	0% - 20%
EP2102879-014	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.17	7.16	0.140	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3582314)									
EP2102890-001	0089_SW310_210317	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	42600	41900	1.59	0% - 20%
EP2102892-010	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	43200	42800	0.814	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3582315)									
EP2102890-001	0089_SW310_210317	EA025H: Suspended Solids (SS)	----	5	mg/L	18	12	38.7	No Limit
EP2102900-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	94	86	9.13	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3582964)									
EP2102908-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	186	187	0.944	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	186	187	0.944	0% - 20%
EP2102879-014	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	123	122	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	123	122	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3572781)									
EP2102879-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11200	11000	1.21	0% - 20%
EP2102879-012	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	21000	20500	2.02	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3572782)									
EP2102879-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	30300	30600	0.981	0% - 20%
EP2102879-012	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	55500	55600	0.151	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3574090)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3574090) - continued									
EP2102890-001	0089_SW310_210317	ED093F: Calcium	7440-70-2	1	mg/L	505	505	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1580	1580	0.265	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12400	12400	0.460	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	700	705	0.726	0% - 20%
EP2102901-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	493	513	4.05	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1540	1590	2.75	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12000	12400	2.61	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	689	717	3.96	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3578688)									
EP2102836-014	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	4	0.00	No Limit
EP2102837-010	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	22	26	16.6	0% - 50%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3577266)									
EP2102900-003	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	6.55	7.20	9.43	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.25	0.26	0.00	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.32	0.39	18.4	0% - 50%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	3.65	3.93	7.31	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.29	0.32	11.7	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3577266)									
EP2102900-003	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.29	0.28	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.34	0.34	0.00	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.38	1.48	7.36	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.12	0.12	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3577266)									
EP2102900-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.03	0.04	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3577266) - continued									
EP2102900-003	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3577266)									
EP2102900-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.21	0.21	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3577266)									
EP2102900-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	13.4	14.6	8.14	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3582963)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.5	98.5	102
				----	7 pH Unit	99.6	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3582314)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	88.1	114
				<10	1000 mg/L	104	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3582315)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	112	89.1	120
				<5	1000 mg/L	98.4	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3582964)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	88.0	81.2	126
				<1	200 mg/L	92.4	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572781)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	106	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3572782)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	87.9	114
				<1	1000 mg/L	93.2	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3574090)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	111	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	108	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	107	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3578688)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	113	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3577266)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	121	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	113	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3577266) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	112	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	137	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3577266)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	119	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	127	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	122	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	126	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	128	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	131	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	133	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	127	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	127	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3577266)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	135	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	121	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	122	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	123	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	112	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	128	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	126	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3577266)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	122	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	124	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	119	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	115	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572781)							
EP2102879-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3572782)							
EP2102879-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3578688)							
EP2102837-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	114	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102890**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 26-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 1
Order number	: DEF19009/730	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102879--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102879--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_SW310_210317	----	----	----	24-Mar-2021	17-Mar-2021	**7**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_SW310_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	17-Mar-2021	×

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_SW310_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	24-Mar-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW310_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	24-Mar-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW310_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	31-Mar-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW310_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	14-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW310_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	14-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW310_210317	**17-Mar-2021**	**----**	----	----	**19-Mar-2021**	24-Mar-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW310_210317	**17-Mar-2021**	**----**	----	----	**22-Mar-2021**	14-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW310_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW310_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW310_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW310_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW310_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	17	**5.88**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102890**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20391	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 17-Mar-2021 16:10	Issue Date	: 18-Mar-2021
Client Requested Due Date	: 29-Mar-2021	Scheduled Reporting Date	: **29-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 18.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102890-001	17-Mar-2021 13:14	0089_SW310_210317	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP005 Total Organic Carbon (TOC)
EP2102890-001	17-Mar-2021 13:14	0089_SW310_210317	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 20391 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17.03.21 1610	DATE TIME: 17/3 1610	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW310		17/03/2021 01:14 PM	Water	ALS: 4 Non ALS: 0	No	X	toc not doc	

Environmental Division
Perth
Work Order Reference
EP2102890

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 20391 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW310	HDPE (no PTFE)	20 mL	00352010080536	Grey	No	
001	0089_SW310	HDPE (no PTFE)	20 mL	00352010071807	Grey	No	
001	0089_SW310	Clear Plastic Bottle - Natural	250 mL	00070719175398	Green	No	
001	0089_SW310	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001787	Purple	No	

Total Bottle Count: ALS: 4, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102892**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021 16:10
Order number	: DEF19009/730	Date Analysis Commenced	: 22-Mar-2021
C-O-C number	: 20383	Issue Date	: 29-Mar-2021 10:49
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW308_210317	0089_PW316_210317	0089_PW307_210317	0089_PW315_210317	0089_PW314_210317
				Sampling date / time	17-Mar-2021 13:04	17-Mar-2021 13:11	17-Mar-2021 13:18	17-Mar-2021 13:35	17-Mar-2021 13:41
					EP2102892-003	EP2102892-005	EP2102892-006	EP2102892-007	EP2102892-008
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.93**	**7.85**	**7.91**	**7.81**	**7.74**
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**43400**	**42800**	**43900**	**43200**	**45900**
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**531**	**419**	**174**	**251**	**145**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**156**	**131**	**118**	**121**	**131**
Total Alkalinity as CaCO3	----	1	mg/L		**156**	**131**	**118**	**121**	**131**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**3040**	**3220**	**3030**	**2940**	**3110**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**20400**	**21900**	**20600**	**20200**	**20900**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**420**	**451**	**424**	**412**	**433**
Magnesium	7439-95-4	1	mg/L		**1300**	**1400**	**1300**	**1270**	**1330**
Sodium	7440-23-5	1	mg/L		**10300**	**11100**	**10400**	**10100**	**10600**
Potassium	7440-09-7	1	mg/L		**556**	**615**	**557**	**542**	**577**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**642**	**687**	**646**	**633**	**657**
ø Total Cations	----	0.01	meq/L		**590**	**636**	**595**	**578**	**607**
ø Ionic Balance	----	0.01	%		**4.19**	**3.86**	**4.17**	**4.55**	**3.96**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**8**	**8**	**5**	**8**	**5**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW308_210317	0089_PW316_210317	0089_PW307_210317	0089_PW315_210317	0089_PW314_210317
				Sampling date / time	17-Mar-2021 13:04	17-Mar-2021 13:11	17-Mar-2021 13:18	17-Mar-2021 13:35	17-Mar-2021 13:41
Compound	CAS Number	LOR	Unit		EP2102892-003	EP2102892-005	EP2102892-006	EP2102892-007	EP2102892-008
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.01**	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW308_210317	0089_PW316_210317	0089_PW307_210317	0089_PW315_210317	0089_PW314_210317
				Sampling date / time	17-Mar-2021 13:04	17-Mar-2021 13:11	17-Mar-2021 13:18	17-Mar-2021 13:35	17-Mar-2021 13:41
Compound	CAS Number	LOR	Unit		EP2102892-003	EP2102892-005	EP2102892-006	EP2102892-007	EP2102892-008
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.01**	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.01**	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.01**	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**89.8**	**100**	**102**	**99.6**
13C8-PFOA	----	0.02	%		**92.7**	**95.6**	**101**	**100**	**99.1**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW306_210317	----	----	----	----
				Sampling date / time	17-Mar-2021 13:49	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102892-009	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.62	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		44700	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		97	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		201	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		201	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3050	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		20600	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		465	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1340	----	----	----	----
Sodium	7440-23-5	1	mg/L		10600	----	----	----	----
Potassium	7440-09-7	1	mg/L		576	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		649	----	----	----	----
ø Total Cations	----	0.01	meq/L		609	----	----	----	----
ø Ionic Balance	----	0.01	%		3.13	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		8	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW306_210317	----	----	----	----
			Sampling date / time		17-Mar-2021 13:49	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102892-009	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW306_210317	----	----	----	----
				Sampling date / time	17-Mar-2021 13:49	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102892-009	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**100**	----	----	----	----
13C8-PFOA	----	0.02	%		**99.6**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW382_210317	0089_SW383_210317	0089_SW311_210317	0089_SW309_210317	----
			Sampling date / time	17-Mar-2021 10:51	17-Mar-2021 10:53	17-Mar-2021 13:06	17-Mar-2021 13:51	----
Compound	CAS Number	LOR	Unit	EP2102892-001	EP2102892-002	EP2102892-004	EP2102892-010	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.75	7.96	8.09	8.15	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	41200	40200	42400	43200	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	23	29	12	10	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	110	119	112	109	----
Total Alkalinity as CaCO3	----	1	mg/L	110	119	112	109	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2960	2920	2970	2850	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20200	19900	19800	20200	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	392	406	433	402	----
Magnesium	7439-95-4	1	mg/L	1210	1250	1340	1240	----
Sodium	7440-23-5	1	mg/L	9550	9910	10700	9870	----
Potassium	7440-09-7	1	mg/L	506	532	575	528	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	634	624	623	631	----
ø Total Cations	----	0.01	meq/L	547	568	612	565	----
ø Ionic Balance	----	0.01	%	7.29	4.76	0.86	5.55	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	3	2	2	1	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW382_210317	0089_SW383_210317	0089_SW311_210317	0089_SW309_210317	----
				Sampling date / time	17-Mar-2021 10:51	17-Mar-2021 10:53	17-Mar-2021 13:06	17-Mar-2021 13:51	----
Compound	CAS Number	LOR	Unit		EP2102892-001	EP2102892-002	EP2102892-004	EP2102892-010	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW382_210317	0089_SW383_210317	0089_SW311_210317	0089_SW309_210317	----
				Sampling date / time	17-Mar-2021 10:51	17-Mar-2021 10:53	17-Mar-2021 13:06	17-Mar-2021 13:51	----
Compound	CAS Number	LOR	Unit		EP2102892-001	EP2102892-002	EP2102892-004	EP2102892-010	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.8**	**88.0**	**97.8**	**113**	----
13C8-PFOA	----	0.02	%		**97.9**	**92.4**	**100**	**104**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102892**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 22-Mar-2021
C-O-C number	: 20383	Issue Date	: 29-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3585608)									
EP2102892-002	0089_SW383_210317	EA005-P: pH Value	----	0.01	pH Unit	7.96	7.98	0.251	0% - 20%
EP2102897-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.13	8.13	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3582280)									
EP2102892-001	0089_SW382_210317	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	41200	40400	1.96	0% - 20%
EP2102901-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	38800	39800	2.34	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3582314)									
EP2102890-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	42600	41900	1.59	0% - 20%
EP2102892-010	0089_SW309_210317	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	43200	42800	0.814	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3582281)									
EP2102892-001	0089_SW382_210317	EA025H: Suspended Solids (SS)	----	5	mg/L	23	14	47.6	No Limit
EP2102901-009	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	26	22	16.5	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3582315)									
EP2102890-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	18	12	38.7	No Limit
EP2102900-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	94	86	9.13	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3585607)									
EP2102892-002	0089_SW383_210317	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	119	119	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	119	119	0.00	0% - 20%
EP2102897-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	119	118	0.978	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	119	118	0.978	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3572774)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3572774) - continued									
EP2102837-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	210	215	2.74	0% - 20%
EP2102892-001	0089_SW382_210317	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2960	2900	1.82	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3572775)									
EP2102837-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2180	2150	1.43	0% - 20%
EP2102892-001	0089_SW382_210317	ED045G: Chloride	16887-00-6	1	mg/L	20200	19600	2.58	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3574083)									
EP2102892-001	0089_SW382_210317	ED093F: Calcium	7440-70-2	1	mg/L	392	403	2.65	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1210	1250	3.32	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9550	9890	3.55	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	506	526	3.96	0% - 20%
EP2102927-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	170	172	0.688	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	469	471	0.464	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2130	2140	0.525	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	35	35	0.00	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3578688)									
EP2102836-014	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	4	0.00	No Limit
EP2102837-010	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	22	26	16.6	0% - 50%
EP005: Total Organic Carbon (TOC) (QC Lot: 3580611)									
EP2102892-009	0089_PW306_210317	EP005: Total Organic Carbon	----	1	mg/L	8	7	0.00	No Limit
EP2102901-009	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3577266)									
EP2102900-003	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	6.55	7.20	9.43	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.25	0.26	0.00	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.32	0.39	18.4	0% - 50%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	3.65	3.93	7.31	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.29	0.32	11.7	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3579871)									
EP2102901-004	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.01	0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3577266)									
EP2102900-003	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.29	0.28	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.34	0.34	0.00	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.38	1.48	7.36	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.12	0.12	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3577266) - continued									
EP2102900-003	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3579871)									
EP2102901-004	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3577266)									
EP2102900-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.03	0.04	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3579871)									
EP2102901-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3579871) - continued									
EP2102901-004	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3577266)									
EP2102900-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.21	0.21	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3579871)									
EP2102901-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3577266)									
EP2102900-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	13.4	14.6	8.14	0% - 20%
EP231P: PFAS Sums (QC Lot: 3579871)									
EP2102901-004	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.01	0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3585608)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3582280)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114
				<10	1000 mg/L	102	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3582314)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	88.1	114
				<10	1000 mg/L	104	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3582281)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	110	89.1	120
				<5	1000 mg/L	97.0	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3582315)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	112	89.1	120
				<5	1000 mg/L	98.4	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3585607)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	101	81.2	126
				<1	200 mg/L	91.6	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572774)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	107	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3572775)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.4	87.9	114
				<1	1000 mg/L	97.4	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3574083)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	92.8	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	88.2	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	90.1	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.4	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3578688)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 3578688) - continued								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	87.2	116
				<1	100 mg/L	113	87.2	116
EP005: Total Organic Carbon (TOC) (QCLot: 3580611)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	109	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3577266)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	121	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	113	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	112	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	137	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3579871)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	120	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	118	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	118	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	104	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3581629)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	124	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	116	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	121	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	124	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	123	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3577266)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	119	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	127	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	122	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	126	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	128	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	131	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	133	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	127	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	127	71.0	132

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3579871)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	114	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	120	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	114	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	107	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	123	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3581629)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	109	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	122	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	128	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	125	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	127	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	127	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	123	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	120	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	125	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	115	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3577266)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	135	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	121	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	122	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	123	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	112	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	128	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	126	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3579871)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	125	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	119	62.6	147

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3579871) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	115	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	112	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	113	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	120	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3581629)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	123	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	100	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	111	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	114	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	112	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	129	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	119	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3577266)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	122	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	124	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	119	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	115	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3579871)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	110	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	112	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	101	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	108	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3581629)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	115	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	116	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	117	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	123	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572774)							
EP2102837-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	115	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3572775)							
EP2102837-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	124	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3578688)							
EP2102837-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	114	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3580611)							
EP2102892-010	0089_SW309_210317	EP005: Total Organic Carbon	----	100 mg/L	108	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3579871)							
EP2102901-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	110	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	116	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	114	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	117	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	116	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	102	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3579871)							
EP2102901-007	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	113	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	109	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	113	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	109	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	102	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	106	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	112	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	105	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	114	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	116	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	115	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3579871)							
EP2102901-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	118	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	114	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	116	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	118	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	108	57.6	145

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3579871) - continued							
EP2102901-007	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	114	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	112	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3579871)							
EP2102901-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	115	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	103	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	100	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	114	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102892**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 29-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 10
Order number	: DEF19009/730	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_SW382_210317,	0089_SW383_210317,	----	----	----	25-Mar-2021	17-Mar-2021	**8**
0089_PW308_210317,	0089_SW311_210317,						
0089_PW316_210317,	0089_PW307_210317,						
0089_PW315_210317,	0089_PW314_210317,						
0089_PW306_210317,	0089_SW309_210317						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	37	5.41	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	37	2.70	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_SW382_210317,	0089_SW383_210317,	**17-Mar-2021**	**----**	----	----	**25-Mar-2021**	17-Mar-2021	×
0089_PW308_210317,	0089_SW311_210317,							
0089_PW316_210317,	0089_PW307_210317,							
0089_PW315_210317,	0089_PW314_210317,							
0089_PW306_210317,	0089_SW309_210317							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317, 0089_PW306_210317, 0089_SW309_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	24-Mar-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317, 0089_PW306_210317, 0089_SW309_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	24-Mar-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317, 0089_PW306_210317, 0089_SW309_210317	**17-Mar-2021**	**----**	----	----	**25-Mar-2021**	31-Mar-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317, 0089_PW306_210317, 0089_SW309_210317	**17-Mar-2021**	**----**	----	----	**26-Mar-2021**	14-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317, 0089_PW306_210317, 0089_SW309_210317	**17-Mar-2021**	**----**	----	----	**26-Mar-2021**	14-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317, 0089_PW306_210317, 0089_SW309_210317	**17-Mar-2021**	**----**	----	----	**22-Mar-2021**	24-Mar-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317	**17-Mar-2021**	**----**	----	----	**22-Mar-2021**	14-Apr-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW306_210317, 0089_SW309_210317	**17-Mar-2021**	**----**	----	----	**23-Mar-2021**	14-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW306_210317	**17-Mar-2021**	**23-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	13-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_SW309_210317	**17-Mar-2021**	**26-Mar-2021**	13-Sep-2021	✓	**26-Mar-2021**	13-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW306_210317	**17-Mar-2021**	**23-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	13-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_SW309_210317	**17-Mar-2021**	**26-Mar-2021**	13-Sep-2021	✓	**26-Mar-2021**	13-Sep-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW306_210317	**17-Mar-2021**	**23-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	13-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_SW309_210317	**17-Mar-2021**	**26-Mar-2021**	13-Sep-2021	✓	**26-Mar-2021**	13-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW306_210317	**17-Mar-2021**	**23-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	13-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_SW309_210317	**17-Mar-2021**	**26-Mar-2021**	13-Sep-2021	✓	**26-Mar-2021**	13-Sep-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW382_210317, 0089_SW383_210317, 0089_PW308_210317, 0089_SW311_210317, 0089_PW316_210317, 0089_PW307_210317, 0089_PW315_210317, 0089_PW314_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW306_210317	**17-Mar-2021**	**23-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	13-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_SW309_210317	**17-Mar-2021**	**26-Mar-2021**	13-Sep-2021	✓	**26-Mar-2021**	13-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	37	**5.41**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	28	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	36	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	37	**8.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	28	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	36	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	37	**8.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	36	**5.56**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	37	**2.70**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102892**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20383	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 17-Mar-2021 16:10	Issue Date	: 18-Mar-2021
Client Requested Due Date	: 29-Mar-2021	Scheduled Reporting Date	: **29-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 18.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 10 / 10

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102892-001	17-Mar-2021 10:51	0089_SW382_210317	✓	✓	✓	✓	✓	✓	✓
EP2102892-002	17-Mar-2021 10:53	0089_SW383_210317	✓	✓	✓	✓	✓	✓	✓
EP2102892-003	17-Mar-2021 13:04	0089_PW308_210317	✓	✓	✓	✓	✓	✓	✓
EP2102892-004	17-Mar-2021 13:06	0089_SW311_210317	✓	✓	✓	✓	✓	✓	✓
EP2102892-005	17-Mar-2021 13:11	0089_PW316_210317	✓	✓	✓	✓	✓	✓	✓
EP2102892-006	17-Mar-2021 13:18	0089_PW307_210317	✓	✓	✓	✓	✓	✓	✓
EP2102892-007	17-Mar-2021 13:35	0089_PW315_210317	✓	✓	✓	✓	✓	✓	✓
EP2102892-008	17-Mar-2021 13:41	0089_PW314_210317	✓	✓	✓	✓	✓	✓	✓
EP2102892-009	17-Mar-2021 13:49	0089_PW306_210317	✓	✓	✓	✓	✓	✓	✓
EP2102892-010	17-Mar-2021 13:51	0089_SW309_210317	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102892-001	17-Mar-2021 10:51	0089_SW382_210317	✓
EP2102892-002	17-Mar-2021 10:53	0089_SW383_210317	✓
EP2102892-003	17-Mar-2021 13:04	0089_PW308_210317	✓
EP2102892-004	17-Mar-2021 13:06	0089_SW311_210317	✓
EP2102892-005	17-Mar-2021 13:11	0089_PW316_210317	✓
EP2102892-006	17-Mar-2021 13:18	0089_PW307_210317	✓
EP2102892-007	17-Mar-2021 13:35	0089_PW315_210317	✓
EP2102892-008	17-Mar-2021 13:41	0089_PW314_210317	✓
EP2102892-009	17-Mar-2021 13:49	0089_PW306_210317	✓
EP2102892-010	17-Mar-2021 13:51	0089_SW309_210317	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

ALS COC#: 20383 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 12.03.21 @ 1610	DATE TIME: 17/3 1610	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW382		17/03/2021 10:51 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_SW383		17/03/2021 10:53 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_PW308		17/03/2021 01:04 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_SW311		17/03/2021 01:06 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		
005	0089_PW316	plus toc vial	17/03/2021 01:11 PM	Water	ALS: 3 Non ALS: 1	No	Partial 7/8	X		
006	0089_PW307		17/03/2021 01:18 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_PW315		17/03/2021 01:35 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_PW314		17/03/2021 01:41 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_PW306		17/03/2021 01:49 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division Perth

Work Order Reference

EP2102892

Wednesday, March 17, 2021 7:22:33 AM

CHAIN OF CUSTODY

COC#: **20383** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SW309		17/03/2021 01:51 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

ALS COC#: 20383 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW382	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_SW383	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW308	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW311	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_PW316	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **20383** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW307	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW315	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_PW314	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_PW306	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_SW309	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 20383 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW382	Clear Plastic Bottle - Natural	250 mL	00070719175421	Green	No	
001	0089_SW382	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001477	Purple	No	
001	0089_SW382	HDPE (no PTFE)	20 mL	00352010071294	Grey	No	
001	0089_SW382	HDPE (no PTFE)	20 mL	00352010071204	Grey	No	
002	0089_SW383	Clear Plastic Bottle - Natural	250 mL	00070719175446	Green	No	
002	0089_SW383	HDPE (no PTFE)	20 mL	00352010071941	Grey	No	
002	0089_SW383	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001832	Purple	No	
002	0089_SW383	HDPE (no PTFE)	20 mL	00352010071852	Grey	No	
003	0089_PW308	Clear Plastic Bottle - Natural	250 mL	00070719175668	Green	No	
003	0089_PW308	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049556	Purple	No	
003	0089_PW308	HDPE (no PTFE)	20 mL	00352010071619	Grey	No	
003	0089_PW308	HDPE (no PTFE)	20 mL	00352010071621	Grey	No	
004	0089_SW311	HDPE (no PTFE)	20 mL	00352010071697	Grey	No	
004	0089_SW311	HDPE (no PTFE)	20 mL	00352010071355	Grey	No	
004	0089_SW311	HDPE (no PTFE)	20 mL	00352010071477	Grey	No	
004	0089_SW311	HDPE (no PTFE)	20 mL	00352010071386	Grey	No	
004	0089_SW311	Clear Plastic Bottle - Natural	250 mL	00070719175538	Green	No	
004	0089_SW311	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049458	Purple	No	
005	0089_PW316	HDPE (no PTFE)	20 mL	00352010071377	Grey	No	
005	0089_PW316	HDPE (no PTFE)	20 mL	00352010071480	Grey	No	
005	0089_PW316	Clear Plastic Bottle - Natural	250 mL	00070719175678	Green	No	
006	0089_PW307	Clear Plastic Bottle - Natural	250 mL	00070719175425	Green	No	
006	0089_PW307	HDPE (no PTFE)	20 mL	00352010080554	Grey	No	
006	0089_PW307	HDPE (no PTFE)	20 mL	00352010080420	Grey	No	
006	0089_PW307	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001827	Purple	No	
007	0089_PW315	Clear Plastic Bottle - Natural	250 mL	00070719175573	Green	No	

CHAIN OF CUSTODY

ALS COC#: **20383** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_PW315	HDPE (no PTFE)	20 mL	00352010071323	Grey	No	
007	0089_PW315	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049481	Purple	No	
007	0089_PW315	HDPE (no PTFE)	20 mL	00352010071139	Grey	No	
008	0089_PW314	HDPE (no PTFE)	20 mL	00352010071413	Grey	No	
008	0089_PW314	HDPE (no PTFE)	20 mL	00352010071176	Grey	No	
008	0089_PW314	Clear Plastic Bottle - Natural	250 mL	00070719175401	Green	No	
008	0089_PW314	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001848	Purple	No	
009	0089_PW306	HDPE (no PTFE)	20 mL	00352010071343	Grey	No	
009	0089_PW306	HDPE (no PTFE)	20 mL	00352010071206	Grey	No	
009	0089_PW306	Clear Plastic Bottle - Natural	250 mL	00070719175484	Green	No	
009	0089_PW306	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001779	Purple	No	
010	0089_SW309	Clear Plastic Bottle - Natural	250 mL	00070719175459	Green	No	
010	0089_SW309	HDPE (no PTFE)	20 mL	00352010071296	Grey	No	
010	0089_SW309	HDPE (no PTFE)	20 mL	00352010071329	Grey	No	
010	0089_SW309	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001840	Purple	No	

Total Bottle Count: ALS: 41, Non ALS: 1

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102900**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Mar-2021 16:10
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20370	Issue Date	: 26-Mar-2021 15:48
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW288_210317	0089_MW226_210317	0089_MW256_210317	0089_MW255_210317	0089_QC301_210317
			Sampling date / time	17-Mar-2021 12:27	17-Mar-2021 13:04	17-Mar-2021 13:39	17-Mar-2021 13:45	17-Mar-2021 08:13
Compound	CAS Number	LOR	Unit	EP2102900-001	EP2102900-002	EP2102900-003	EP2102900-004	EP2102900-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.91**	**7.72**	**7.98**	**7.96**	**----**
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**566**	**32600**	**775**	**540**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**490**	**94**	**222**	**986**	**----**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	**----**
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	**----**
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**213**	**542**	**300**	**410**	**----**
Total Alkalinity as CaCO3	----	1	mg/L	**213**	**542**	**300**	**410**	**----**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**98**	**2300**	**40**	**38**	**----**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**124**	**14200**	**239**	**65**	**----**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**57**	**444**	**111**	**106**	**----**
Magnesium	7439-95-4	1	mg/L	**31**	**1170**	**17**	**18**	**----**
Sodium	7440-23-5	1	mg/L	**107**	**8660**	**130**	**68**	**----**
Potassium	7440-09-7	1	mg/L	**9**	**546**	**5**	**4**	**----**
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**9.79**	**459**	**13.6**	**10.8**	**----**
ø Total Cations	----	0.01	meq/L	**10.3**	**509**	**12.7**	**9.83**	**----**
ø Ionic Balance	----	0.01	%	**2.42**	**5.14**	**3.23**	**4.77**	**----**
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**14**	**54**	**5**	**10**	**----**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	**0.44**	<0.02	**0.25**	**0.10**	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	**0.28**	<0.02	**0.32**	**0.07**	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.74**	<0.02	**3.65**	**1.05**	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	**0.04**	<0.02	**0.29**	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW288_210317	0089_MW226_210317	0089_MW256_210317	0089_MW255_210317	0089_QC301_210317
				Sampling date / time	17-Mar-2021 12:27	17-Mar-2021 13:04	17-Mar-2021 13:39	17-Mar-2021 13:45	17-Mar-2021 08:13
Compound	CAS Number	LOR	Unit		EP2102900-001	EP2102900-002	EP2102900-003	EP2102900-004	EP2102900-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**5.85**	<0.01	**6.55**	**0.65**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.11**	<0.02	**0.34**	**0.04**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.52**	<0.02	**1.38**	**0.19**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.03**	<0.02	**0.12**	**0.03**	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.04**	<0.01	**0.29**	**0.02**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		**0.02**	<0.02	**0.03**	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW288_210317	0089_MW226_210317	0089_MW256_210317	0089_MW255_210317	0089_QC301_210317
				Sampling date / time	17-Mar-2021 12:27	17-Mar-2021 13:04	17-Mar-2021 13:39	17-Mar-2021 13:45	17-Mar-2021 08:13
Compound	CAS Number	LOR	Unit		EP2102900-001	EP2102900-002	EP2102900-003	EP2102900-004	EP2102900-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	**0.21**	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**8.07**	<0.01	**13.4**	**2.15**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**6.59**	<0.01	**10.2**	**1.70**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**7.73**	<0.01	**12.8**	**2.08**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**101**	**86.1**	**99.2**	**98.8**
13C8-PFOA	----	0.02	%		**99.3**	**98.6**	**98.2**	**102**	**91.6**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC401_210317	0089_QC302_210317	0089_QC402_210317	0089_QC303_210317	0089_QC403_210317
				Sampling date / time	17-Mar-2021 08:14	17-Mar-2021 08:14	17-Mar-2021 08:15	17-Mar-2021 08:15	17-Mar-2021 08:16
Compound	CAS Number	LOR	Unit		EP2102900-006	EP2102900-007	EP2102900-008	EP2102900-009	EP2102900-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC401_210317	0089_QC302_210317	0089_QC402_210317	0089_QC303_210317	0089_QC403_210317
				Sampling date / time	17-Mar-2021 08:14	17-Mar-2021 08:14	17-Mar-2021 08:15	17-Mar-2021 08:15	17-Mar-2021 08:16
					EP2102900-006	EP2102900-007	EP2102900-008	EP2102900-009	EP2102900-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**100**	**98.6**	**109**	**102**	**97.5**
13C8-PFOA	----	0.02	%		**94.3**	**98.1**	**96.9**	**97.3**	**95.5**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102900**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 18-Mar-2021
C-O-C number	: 20370	Issue Date	: 26-Mar-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3585608)									
EP2102892-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.96	7.98	0.251	0% - 20%
EP2102897-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.13	8.13	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3582314)									
EP2102890-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	42600	41900	1.59	0% - 20%
EP2102892-010	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	43200	42800	0.814	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3582315)									
EP2102890-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	18	12	38.7	No Limit
EP2102900-002	0089_MW226_210317	EA025H: Suspended Solids (SS)	----	5	mg/L	94	86	9.13	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3585607)									
EP2102892-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	119	119	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	119	119	0.00	0% - 20%
EP2102897-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	119	118	0.978	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	119	118	0.978	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3572781)									
EP2102879-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11200	11000	1.21	0% - 20%
EP2102879-012	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	21000	20500	2.02	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3572782)									
EP2102879-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	30300	30600	0.981	0% - 20%
EP2102879-012	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	55500	55600	0.151	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3574090)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3574090) - continued									
EP2102890-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	505	505	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1580	1580	0.265	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12400	12400	0.460	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	700	705	0.726	0% - 20%
EP2102901-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	493	513	4.05	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1540	1590	2.75	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12000	12400	2.61	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	689	717	3.96	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3572495)									
EP2102752-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	12	10	10.5	0% - 50%
EP2102752-011	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	6	38.6	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3577266)									
EP2102900-003	0089_MW256_210317	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	6.55	7.20	9.43	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.25	0.26	0.00	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.32	0.39	18.4	0% - 50%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	3.65	3.93	7.31	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.29	0.32	11.7	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3577266)									
EP2102900-003	0089_MW256_210317	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.29	0.28	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.34	0.34	0.00	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.38	1.48	7.36	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.12	0.12	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3577266)									
EP2102900-003	0089_MW256_210317	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.03	0.04	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3577266) - continued									
EP2102900-003	0089_MW256_210317	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3577266)									
EP2102900-003	0089_MW256_210317	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.21	0.21	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3577266)									
EP2102900-003	0089_MW256_210317	EP231X: Sum of PFAS	----	0.01	µg/L	13.4	14.6	8.14	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3585608)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3582314)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	88.1	114
				<10	1000 mg/L	104	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3582315)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	112	89.1	120
				<5	1000 mg/L	98.4	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3585607)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	101	81.2	126
				<1	200 mg/L	91.6	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572781)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	106	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3572782)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	87.9	114
				<1	1000 mg/L	93.2	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3574090)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	111	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	108	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	107	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3572495)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	109	87.2	116
				<1	100 mg/L	108	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3577266)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	121	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	113	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3577266) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	112	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	137	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3577266)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	119	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	127	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	122	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	126	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	128	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	131	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	133	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	127	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	127	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3577266)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	135	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	121	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	122	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	123	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	112	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	128	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	126	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3577266)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	122	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	124	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	119	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	115	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572781)							
EP2102879-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3572782)							
EP2102879-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3572495)							
EP2102752-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	105	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102900**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 16-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 26-Mar-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 10
Order number	: DEF19009/730	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102879--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102879--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317	----	----	----	25-Mar-2021	17-Mar-2021	**8**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317	**17-Mar-2021**	**----**	----	----	**25-Mar-2021**	17-Mar-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	24-Mar-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	24-Mar-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317	**17-Mar-2021**	**----**	----	----	**25-Mar-2021**	31-Mar-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	14-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	14-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317	**17-Mar-2021**	**----**	----	----	**19-Mar-2021**	24-Mar-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317	**17-Mar-2021**	**----**	----	----	**18-Mar-2021**	14-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317, 0089_QC301_210317, 0089_QC401_210317, 0089_QC302_210317, 0089_QC402_210317, 0089_QC303_210317, 0089_QC403_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317, 0089_QC301_210317, 0089_QC401_210317, 0089_QC302_210317, 0089_QC402_210317, 0089_QC303_210317, 0089_QC403_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317, 0089_QC301_210317, 0089_QC401_210317, 0089_QC302_210317, 0089_QC402_210317, 0089_QC303_210317, 0089_QC403_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317, 0089_QC301_210317, 0089_QC401_210317, 0089_QC302_210317, 0089_QC402_210317, 0089_QC303_210317, 0089_QC403_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW288_210317, 0089_MW226_210317, 0089_MW256_210317, 0089_MW255_210317, 0089_QC301_210317, 0089_QC401_210317, 0089_QC302_210317, 0089_QC402_210317, 0089_QC303_210317, 0089_QC403_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**23-Mar-2021**	13-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	17	**5.88**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102900**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20370	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 16-Mar-2021 16:10	Issue Date	: 18-Mar-2021
Client Requested Due Date	: 29-Mar-2021	Scheduled Reporting Date	: **29-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 18.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 10 / 10

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102900-001	17-Mar-2021 12:27	0089_MW288_210317	✓	✓	✓	✓	✓	✓	✓
EP2102900-002	17-Mar-2021 13:04	0089_MW226_210317	✓	✓	✓	✓	✓	✓	✓
EP2102900-003	17-Mar-2021 13:39	0089_MW256_210317	✓	✓	✓	✓	✓	✓	✓
EP2102900-004	17-Mar-2021 13:45	0089_MW255_210317	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102900-001	17-Mar-2021 12:27	0089_MW288_210317	✓
EP2102900-002	17-Mar-2021 13:04	0089_MW226_210317	✓
EP2102900-003	17-Mar-2021 13:39	0089_MW256_210317	✓
EP2102900-004	17-Mar-2021 13:45	0089_MW255_210317	✓
EP2102900-005	17-Mar-2021 08:13	0089_QC301_210317	✓
EP2102900-006	17-Mar-2021 08:14	0089_QC401_210317	✓
EP2102900-007	17-Mar-2021 08:14	0089_QC302_210317	✓
EP2102900-008	17-Mar-2021 08:15	0089_QC402_210317	✓
EP2102900-009	17-Mar-2021 08:15	0089_QC303_210317	✓
EP2102900-010	17-Mar-2021 08:16	0089_QC403_210317	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

COC#: **20370** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 17/3 1610	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW288		17/03/2021 12:27 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
002	0089_MW226		17/03/2021 01:04 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
003	0089_MW256		17/03/2021 01:39 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8		X		
004	0089_MW255		17/03/2021 01:45 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
005	0089_QC301		17/03/2021 08:13 AM	Water	ALS: 2 Non ALS: 0	No		X			
006	0089_QC401		17/03/2021 08:14 AM	Water	ALS: 2 Non ALS: 0	No		X			
007	0089_QC302		17/03/2021 08:14 AM	Water	ALS: 2 Non ALS: 0	No		X			
008	0089_QC402		17/03/2021 08:15 AM	Water	ALS: 2 Non ALS: 0	No		X			
009	0089_QC303		17/03/2021 08:15 AM	Water	ALS: 2 Non ALS: 0	No		X			

Environmental Division Perth

Work Order Reference

EP2102900

Telephone : - 61-8-9406 1301

CHAIN OF CUSTODY

COC#: **20370** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_QC403		17/03/2021 08:16 AM	Water	ALS: 2 Non ALS: 0	No		X			

CHAIN OF CUSTODY

COC#: **20370** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW288	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW226	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW256	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW255	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **20370** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW288	Clear Plastic Bottle - Natural	250 mL	00070719175419	Green	No	
001	0089_MW288	HDPE (no PTFE)	20 mL	00352010071119	Grey	No	
001	0089_MW288	HDPE (no PTFE)	20 mL	00352010071230	Grey	No	
001	0089_MW288	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001876	Purple	No	
002	0089_MW226	Clear Plastic Bottle - Natural	250 mL	00070719175663	Green	No	
002	0089_MW226	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049488	Purple	No	
002	0089_MW226	HDPE (no PTFE)	20 mL	00352010071401	Grey	No	
002	0089_MW226	HDPE (no PTFE)	20 mL	00352010071682	Grey	No	
003	0089_MW256	HDPE (no PTFE)	20 mL	00352005006827	Grey	No	
003	0089_MW256	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001731	Purple	No	
003	0089_MW256	HDPE (no PTFE)	20 mL	00352010071530	Grey	No	
003	0089_MW256	HDPE (no PTFE)	20 mL	00352010071160	Grey	No	
003	0089_MW256	HDPE (no PTFE)	20 mL	00352010071311	Grey	No	
003	0089_MW256	Clear Plastic Bottle - Natural	250 mL	00070719175423	Green	No	
004	0089_MW255	HDPE (no PTFE)	20 mL	00352010071538	Grey	No	
004	0089_MW255	HDPE (no PTFE)	20 mL	00352010071432	Grey	No	
004	0089_MW255	Clear Plastic Bottle - Natural	250 mL	00070719175429	Green	No	
004	0089_MW255	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001839	Purple	No	
005	0089_QC301	HDPE (no PTFE)	20 mL	00352010071205	Grey	No	
005	0089_QC301	HDPE (no PTFE)	20 mL	00352010071298	Grey	No	
006	0089_QC401	HDPE (no PTFE)	20 mL	00352010071411	Grey	No	
006	0089_QC401	HDPE (no PTFE)	20 mL	00352010071157	Grey	No	
007	0089_QC302	HDPE (no PTFE)	20 mL	00352010071606	Grey	No	
007	0089_QC302	HDPE (no PTFE)	20 mL	00352010071351	Grey	No	
008	0089_QC402	HDPE (no PTFE)	20 mL	00352010071112	Grey	No	
008	0089_QC402	HDPE (no PTFE)	20 mL	00352010071353	Grey	No	

CHAIN OF CUSTODY

COC#: **20370** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

009	0089_QC303	HDPE (no PTFE)	20 mL	00352010071543	Grey	No	
009	0089_QC303	HDPE (no PTFE)	20 mL	00352010071322	Grey	No	
010	0089_QC403	HDPE (no PTFE)	20 mL	00352010071874	Grey	No	
010	0089_QC403	HDPE (no PTFE)	20 mL	00352010071800	Grey	No	

Total Bottle Count: ALS: 30, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102901**	Page	: 1 of 15
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021 16:10
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20379	Issue Date	: 26-Mar-2021 15:50
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231X: PFAS results for sample #4 confirmed by instrument QC duplicate.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW401_210317	0089_PW380_210317	0089_PW351_210317	0089_PW381_210317	0089_PW352_210317
			Sampling date / time	17-Mar-2021 10:40	17-Mar-2021 10:41	17-Mar-2021 10:43	17-Mar-2021 10:45	17-Mar-2021 10:46
Compound	CAS Number	LOR	Unit	EP2102901-002	EP2102901-003	EP2102901-004	EP2102901-005	EP2102901-006
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.89	7.73	7.81	7.86	7.91
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	41500	43200	41900	40700	41200
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	136	314	122	105	104
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	130	137	141	125	126
Total Alkalinity as CaCO3	----	1	mg/L	130	137	141	125	126
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2980	3140	3000	2870	2960
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	21200	22700	21100	20200	21000
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	487	510	507	504	493
Magnesium	7439-95-4	1	mg/L	1510	1600	1580	1550	1540
Sodium	7440-23-5	1	mg/L	11700	12500	12300	12100	12000
Potassium	7440-09-7	1	mg/L	680	723	702	696	689
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	663	708	660	632	656
ø Total Cations	----	0.01	meq/L	675	719	708	697	691
ø Ionic Balance	----	0.01	%	0.91	0.76	3.49	4.87	2.55
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	2	12	3	2	4
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW401_210317	0089_PW380_210317	0089_PW351_210317	0089_PW381_210317	0089_PW352_210317
				Sampling date / time	17-Mar-2021 10:40	17-Mar-2021 10:41	17-Mar-2021 10:43	17-Mar-2021 10:45	17-Mar-2021 10:46
Compound	CAS Number	LOR	Unit		EP2102901-002	EP2102901-003	EP2102901-004	EP2102901-005	EP2102901-006
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW401_210317	0089_PW380_210317	0089_PW351_210317	0089_PW381_210317	0089_PW352_210317
				Sampling date / time	17-Mar-2021 10:40	17-Mar-2021 10:41	17-Mar-2021 10:43	17-Mar-2021 10:45	17-Mar-2021 10:46
Compound	CAS Number	LOR	Unit		EP2102901-002	EP2102901-003	EP2102901-004	EP2102901-005	EP2102901-006
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**104**	**97.8**	**101**	**100**
13C8-PFOA	----	0.02	%		**95.6**	**97.5**	**96.2**	**99.6**	**99.7**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW346_210317	0089_PW409_210317	----	----	----
			Sampling date / time	17-Mar-2021 14:04	17-Mar-2021 14:07	----	----	----
Compound	CAS Number	LOR	Unit	EP2102901-011	EP2102901-013	--------	--------	--------
				Result	Result	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.62**	**7.77**	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**36700**	**47200**	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**856**	**85**	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**465**	**138**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**465**	**138**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**2660**	**3270**	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**19300**	**22800**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**634**	**585**	----	----	----
Magnesium	7439-95-4	1	mg/L	**1610**	**1840**	----	----	----
Sodium	7440-23-5	1	mg/L	**12700**	**14400**	----	----	----
Potassium	7440-09-7	1	mg/L	**742**	**844**	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**609**	**714**	----	----	----
ø Total Cations	----	0.01	meq/L	**736**	**828**	----	----	----
ø Ionic Balance	----	0.01	%	**9.40**	**7.43**	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**38**	**7**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	**0.03**	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.07**	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW346_210317	0089_PW409_210317	----	----	----
				Sampling date / time	17-Mar-2021 14:04	17-Mar-2021 14:07	----	----	----
Compound	CAS Number	LOR	Unit		EP2102901-011	EP2102901-013	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.05**	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW346_210317	0089_PW409_210317	----	----	----
				Sampling date / time	17-Mar-2021 14:04	17-Mar-2021 14:07	----	----	----
Compound	CAS Number	LOR	Unit		EP2102901-011	EP2102901-013	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.15**	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.12**	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.15**	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**104**	----	----	----
13C8-PFOA	----	0.02	%		**96.9**	**98.2**	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW350_210317	0089_SW353_210317	0089_SW384_210317	0089_SW372_210317	0089_SW410_210317
				Sampling date / time	17-Mar-2021 10:38	17-Mar-2021 10:50	17-Mar-2021 10:52	17-Mar-2021 12:39	17-Mar-2021 13:13
Compound	CAS Number	LOR	Unit		EP2102901-001	EP2102901-007	EP2102901-008	EP2102901-009	EP2102901-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.59	7.94	8.00	8.11	8.20
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		43400	38800	41100	40000	38300
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		241	34	18	26	8
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		161	112	113	113	112
Total Alkalinity as CaCO3	----	1	mg/L		161	112	113	113	112
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3110	2850	2880	2990	2960
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		21700	20400	20800	21000	21000
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		527	474	512	537	540
Magnesium	7439-95-4	1	mg/L		1640	1500	1610	1660	1690
Sodium	7440-23-5	1	mg/L		12700	11700	12600	12800	13100
Potassium	7440-09-7	1	mg/L		750	667	716	741	758
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		680	637	649	657	656
ø Total Cations	----	0.01	meq/L		733	673	724	739	755
ø Ionic Balance	----	0.01	%		3.74	2.75	5.50	5.89	7.01
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		16	2	2	2	2
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW350_210317	0089_SW353_210317	0089_SW384_210317	0089_SW372_210317	0089_SW410_210317
				Sampling date / time	17-Mar-2021 10:38	17-Mar-2021 10:50	17-Mar-2021 10:52	17-Mar-2021 12:39	17-Mar-2021 13:13
Compound	CAS Number	LOR	Unit		EP2102901-001	EP2102901-007	EP2102901-008	EP2102901-009	EP2102901-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.05**	<0.01	<0.01	**0.01**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW350_210317	0089_SW353_210317	0089_SW384_210317	0089_SW372_210317	0089_SW410_210317
				Sampling date / time	17-Mar-2021 10:38	17-Mar-2021 10:50	17-Mar-2021 10:52	17-Mar-2021 12:39	17-Mar-2021 13:13
Compound	CAS Number	LOR	Unit		EP2102901-001	EP2102901-007	EP2102901-008	EP2102901-009	EP2102901-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.05**	<0.01	<0.01	**0.01**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.05**	<0.01	<0.01	**0.01**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.05**	<0.01	<0.01	**0.01**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.6**	**98.9**	**97.5**	**98.0**	**101**
13C8-PFOA	----	0.02	%		**98.6**	**95.8**	**100**	**98.0**	**98.0**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW373_210317	----	----	----	----
				Sampling date / time	17-Mar-2021 14:06	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102901-012	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.04	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		41400	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		65	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		112	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		112	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2990	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		20100	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		504	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1600	----	----	----	----
Sodium	7440-23-5	1	mg/L		12400	----	----	----	----
Potassium	7440-09-7	1	mg/L		715	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		631	----	----	----	----
ø Total Cations	----	0.01	meq/L		714	----	----	----	----
ø Ionic Balance	----	0.01	%		6.17	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		3	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW373_210317	----	----	----	----
				Sampling date / time	17-Mar-2021 14:06	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102901-012	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.04**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW373_210317	----	----	----	----
				Sampling date / time	17-Mar-2021 14:06	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102901-012	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.04**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.04**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.04**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**95.8**	----	----	----	----
13C8-PFOA	----	0.02	%		**96.3**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102901**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20379	Issue Date	: 26-Mar-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA005P: pH by PC Titrator (QC Lot: 3585608)									
EP2102892-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.96	7.98	0.251	0% - 20%
EP2102897-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.13	8.13	0.00	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3585610)									
EP2102901-005	0089_PW381_210317	EA005-P: pH Value	----	0.01	pH Unit	7.86	7.92	0.760	0% - 20%
EP2102903-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.33	8.32	0.120	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3582280)									
EP2102892-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	41200	40400	1.96	0% - 20%
EP2102901-007	0089_SW353_210317	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	38800	39800	2.34	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3582281)									
EP2102892-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	23	14	47.6	No Limit
EP2102901-009	0089_SW372_210317	EA025H: Suspended Solids (SS)	----	5	mg/L	26	22	16.5	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3585607)									
EP2102892-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	119	119	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	119	119	0.00	0% - 20%
EP2102897-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	119	118	0.978	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	119	118	0.978	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3585609)									
EP2102901-005	0089_PW381_210317	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	125	126	1.10	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3585609) - continued									
EP2102901-005	0089_PW381_210317	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	125	126	1.10	0% - 20%
EP2102903-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	2	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	151	151	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	153	152	0.697	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3572777)									
EP2102836-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3000	3030	1.01	0% - 20%
EP2102901-004	0089_PW351_210317	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3000	3000	0.149	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3572778)									
EP2102836-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	21000	20800	0.840	0% - 20%
EP2102901-004	0089_PW351_210317	ED045G: Chloride	16887-00-6	1	mg/L	21100	21200	0.507	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3574090)									
EP2102890-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	505	505	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1580	1580	0.265	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12400	12400	0.460	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	700	705	0.726	0% - 20%
EP2102901-006	0089_PW352_210317	ED093F: Calcium	7440-70-2	1	mg/L	493	513	4.05	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1540	1590	2.75	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12000	12400	2.61	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	689	717	3.96	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3580611)									
EP2102892-009	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	8	7	0.00	No Limit
EP2102901-009	0089_SW372_210317	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3579871)									
EP2102901-004	0089_PW351_210317	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.01	0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3579871)									
EP2102901-004	0089_PW351_210317	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3579871) - continued									
EP2102901-004	0089_PW351_210317	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3579871)									
EP2102901-004	0089_PW351_210317	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3579871)									
EP2102901-004	0089_PW351_210317	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3579871)									
EP2102901-004	0089_PW351_210317	EP231X: Sum of PFAS	----	0.01	µg/L	0.01	0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3585608)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3585610)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3582280)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3582281)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	110	89.1	120
				<5	1000 mg/L	97.0	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3585607)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	101	81.2	126
				<1	200 mg/L	91.6	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3585609)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	101	81.2	126
				<1	200 mg/L	93.6	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572777)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	106	87.7	113
				<1	500 mg/L	105	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3572778)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	87.9	114
				<1	1000 mg/L	101	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3574090)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	111	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	108	88.0	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3574090) - continued								
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	107	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3580611)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	109	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3579871)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	120	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	118	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	118	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	104	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3579871)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	114	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	120	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	114	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	107	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	123	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3579871)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	125	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	119	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	115	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	112	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	113	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	120	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3579871)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	110	63.0	143

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3579871) - continued								
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	112	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	101	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	108	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3572777)							
EP2102836-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3572778)							
EP2102836-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3580611)							
EP2102892-010	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	108	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3579871)							
EP2102901-007	0089_SW353_210317	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	110	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	116	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	114	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	117	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	116	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	102	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3579871)							
EP2102901-007	0089_SW353_210317	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	113	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	109	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	113	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	109	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	102	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	106	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	112	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	105	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	114	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	116	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	115	71.0	132

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3579871)							
EP2102901-007	0089_SW353_210317	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	118	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	114	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	116	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	118	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	108	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	114	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	112	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3579871)							
EP2102901-007	0089_SW353_210317	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	115	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	103	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	100	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	114	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102901**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 26-Mar-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 13
Order number	: DEF19009/730	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102836--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102836--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_PW350_210317,	0089_PW401_210317,	----	----	----	25-Mar-2021	17-Mar-2021	**8**
0089_PW380_210317,	0089_PW351_210317,						
0089_PW381_210317,	0089_PW352_210317,						
0089_SW353_210317,	0089_SW384_210317,						
0089_SW372_210317,	0089_SW410_210317,						
0089_PW346_210317,	0089_SW373_210317,						
0089_PW409_210317							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	17	5.88	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**----**	----	----	**25-Mar-2021**	17-Mar-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	24-Mar-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**----**	----	----	**24-Mar-2021**	24-Mar-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**----**	----	----	**25-Mar-2021**	31-Mar-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**----**	----	----	**26-Mar-2021**	14-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**----**	----	----	**26-Mar-2021**	14-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**----**	----	----	**19-Mar-2021**	24-Mar-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**----**	----	----	**23-Mar-2021**	14-Apr-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**23-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	13-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**23-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	13-Sep-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**23-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	13-Sep-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**23-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	13-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW350_210317, 0089_PW401_210317, 0089_PW380_210317, 0089_PW351_210317, 0089_PW381_210317, 0089_PW352_210317, 0089_SW353_210317, 0089_SW384_210317, 0089_SW372_210317, 0089_SW410_210317, 0089_PW346_210317, 0089_SW373_210317, 0089_PW409_210317	**17-Mar-2021**	**23-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	13-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102901**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20379	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 17-Mar-2021 16:10	Issue Date	: 18-Mar-2021
Client Requested Due Date	: 29-Mar-2021	Scheduled Reporting Date	: **29-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 18.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102901-001	17-Mar-2021 10:38	0089_PW350_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-002	17-Mar-2021 10:40	0089_PW401_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-003	17-Mar-2021 10:41	0089_PW380_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-004	17-Mar-2021 10:43	0089_PW351_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-005	17-Mar-2021 10:45	0089_PW381_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-006	17-Mar-2021 10:46	0089_PW352_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-007	17-Mar-2021 10:50	0089_SW353_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-008	17-Mar-2021 10:52	0089_SW384_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-009	17-Mar-2021 12:39	0089_SW372_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-010	17-Mar-2021 13:13	0089_SW410_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-011	17-Mar-2021 14:04	0089_PW346_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-012	17-Mar-2021 14:06	0089_SW373_210317	✓	✓	✓	✓	✓	✓	✓
EP2102901-013	17-Mar-2021 14:07	0089_PW409_210317	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102901-001	17-Mar-2021 10:38	0089_PW350_210317	✓
EP2102901-002	17-Mar-2021 10:40	0089_PW401_210317	✓
EP2102901-003	17-Mar-2021 10:41	0089_PW380_210317	✓
EP2102901-004	17-Mar-2021 10:43	0089_PW351_210317	✓
EP2102901-005	17-Mar-2021 10:45	0089_PW381_210317	✓
EP2102901-006	17-Mar-2021 10:46	0089_PW352_210317	✓
EP2102901-007	17-Mar-2021 10:50	0089_SW353_210317	✓
EP2102901-008	17-Mar-2021 10:52	0089_SW384_210317	✓
EP2102901-009	17-Mar-2021 12:39	0089_SW372_210317	✓
EP2102901-010	17-Mar-2021 13:13	0089_SW410_210317	✓
EP2102901-011	17-Mar-2021 14:04	0089_PW346_210317	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102901-012	17-Mar-2021 14:06	0089_SW373_210317	✓
EP2102901-013	17-Mar-2021 14:07	0089_PW409_210317	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 20379 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 17/3 16:0	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW350		17/03/2021 10:38 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW401		17/03/2021 10:40 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_PW380		17/03/2021 10:41 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_PW351		17/03/2021 10:43 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		
005	0089_PW381		17/03/2021 10:45 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_PW352		17/03/2021 10:46 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_SW353		17/03/2021 10:50 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		
008	0089_SW384		17/03/2021 10:52 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_SW372		17/03/2021 12:39 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2102901

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: **20379** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SW410		17/03/2021 01:13 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
011	0089_PW346		17/03/2021 02:04 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
012	0089_SW373		17/03/2021 02:06 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
013	0089_PW409		17/03/2021 02:07 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

COC#: **20379** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW350	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW401	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW380	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_PW351	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_PW381	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **20379** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW352	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_SW353	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_SW384	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_SW372	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_SW410	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_PW346	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **20379** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

012	0089_SW373	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
013	0089_PW409	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 20379 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW350	Clear Plastic Bottle - Natural	250 mL	00070719175436	Green	No	
001	0089_PW350	HDPE (no PTFE)	20 mL	00352010080650	Grey	No	
001	0089_PW350	HDPE (no PTFE)	20 mL	00352010080817	Grey	No	
001	0089_PW350	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001582	Purple	No	
002	0089_PW401	Clear Plastic Bottle - Natural	250 mL	00070719175495	Green	No	
002	0089_PW401	HDPE (no PTFE)	20 mL	00352010071113	Grey	No	
002	0089_PW401	HDPE (no PTFE)	20 mL	00352010071190	Grey	No	
002	0089_PW401	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001516	Purple	No	
003	0089_PW380	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001870	Purple	No	
003	0089_PW380	HDPE (no PTFE)	20 mL	00352010071178	Grey	No	
003	0089_PW380	Clear Plastic Bottle - Natural	250 mL	00070719175463	Green	No	
003	0089_PW380	HDPE (no PTFE)	20 mL	00352010071247	Grey	No	
004	0089_PW351	Clear Plastic Bottle - Natural	250 mL	00070719175450	Green	No	
004	0089_PW351	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001842	Purple	No	
004	0089_PW351	HDPE (no PTFE)	20 mL	00352010071192	Grey	No	
004	0089_PW351	HDPE (no PTFE)	20 mL	00352010080460	Grey	No	
004	0089_PW351	HDPE (no PTFE)	20 mL	00352010071209	Grey	No	
004	0089_PW351	HDPE (no PTFE)	20 mL	00352010080810	Grey	No	
005	0089_PW381	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001741	Purple	No	
005	0089_PW381	Clear Plastic Bottle - Natural	250 mL	00070719175394	Green	No	
005	0089_PW381	HDPE (no PTFE)	20 mL	00352010080485	Grey	No	
005	0089_PW381	HDPE (no PTFE)	20 mL	00352010071890	Grey	No	
006	0089_PW352	Clear Plastic Bottle - Natural	250 mL	00070719175441	Green	No	
006	0089_PW352	HDPE (no PTFE)	20 mL	00352010071826	Grey	No	
006	0089_PW352	HDPE (no PTFE)	20 mL	00352010071901	Grey	No	
006	0089_PW352	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001807	Purple	No	

CHAIN OF CUSTODY

ALS COC#: **20379** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_SW353	Clear Plastic Bottle - Natural	250 mL	00070719175532	Green	No	
007	0089_SW353	HDPE (no PTFE)	20 mL	00352010080487	Grey	No	
007	0089_SW353	HDPE (no PTFE)	20 mL	00352010071961	Grey	No	
007	0089_SW353	HDPE (no PTFE)	20 mL	00352010071390	Grey	No	
007	0089_SW353	HDPE (no PTFE)	20 mL	00352010071581	Grey	No	
007	0089_SW353	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001553	Purple	No	
008	0089_SW384	Clear Plastic Bottle - Natural	250 mL	00070719175439	Green	No	
008	0089_SW384	HDPE (no PTFE)	20 mL	00352010080826	Grey	No	
008	0089_SW384	HDPE (no PTFE)	20 mL	00352010080580	Grey	No	
008	0089_SW384	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001747	Purple	No	
009	0089_SW372	HDPE (no PTFE)	20 mL	00352010071148	Grey	No	
009	0089_SW372	HDPE (no PTFE)	20 mL	00352010071541	Grey	No	
009	0089_SW372	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001295	Purple	No	
009	0089_SW372	Clear Plastic Bottle - Natural	250 mL	00070719175489	Green	No	
010	0089_SW410	Clear Plastic Bottle - Natural	250 mL	00070719175399	Green	No	
010	0089_SW410	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001814	Purple	No	
010	0089_SW410	HDPE (no PTFE)	20 mL	00352010071964	Grey	No	
010	0089_SW410	HDPE (no PTFE)	20 mL	00352010080763	Grey	No	
011	0089_PW346	Clear Plastic Bottle - Natural	250 mL	00070719175458	Green	No	
011	0089_PW346	HDPE (no PTFE)	20 mL	00352010071254	Grey	No	
011	0089_PW346	HDPE (no PTFE)	20 mL	00352010071264	Grey	No	
011	0089_PW346	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001713	Purple	No	
012	0089_SW373	Clear Plastic Bottle - Natural	250 mL	00070719175366	Green	No	
012	0089_SW373	HDPE (no PTFE)	20 mL	00352010071507	Grey	No	
012	0089_SW373	HDPE (no PTFE)	20 mL	00352010071143	Grey	No	
012	0089_SW373	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001557	Purple	No	
013	0089_PW409	Clear Plastic Bottle - Natural	250 mL	00070719175465	Green	No	

CHAIN OF CUSTODY

COC#: **20379** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

013	0089_PW409	HDPE (no PTFE)	20 mL	00352010071510	Grey	No	
013	0089_PW409	HDPE (no PTFE)	20 mL	00352010071404	Grey	No	
013	0089_PW409	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049518	Purple	No	

Total Bottle Count: ALS: 56, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102902**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021 16:10
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20400	Issue Date	: 25-Mar-2021 20:50
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED008: Poor duplicate precision was obtained for Exchangeable Sodium Percent on sample EP2102888-009 due to possible sample heterogeneity. Results have been confirmed by re-extraction and re-analysis.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD409_210317	0089_SD366_210317	----	----	----
			Sampling date / time	17-Mar-2021 14:01	17-Mar-2021 14:02	----	----	----
Compound	CAS Number	LOR	Unit	EP2102902-001	EP2102902-002	--------	--------	--------
				Result	Result	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.2**	**8.3**	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**3270**	**5790**	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**24.2**	**42.2**	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**3.6**	**10.6**	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.5**	**4.6**	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.1**	**0.6**	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**4.2**	**15.8**	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**3.0**	**3.5**	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	**3.1**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	**0.0008**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD409_210317	0089_SD366_210317	----	----	----
				Sampling date / time	17-Mar-2021 14:01	17-Mar-2021 14:02	----	----	----
Compound	CAS Number	LOR	Unit		EP2102902-001	EP2102902-002	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	**0.0008**	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)			Sample ID	**0089_SD409_210317**	**0089_SD366_210317**	**----**	**----**	**----**
			Sampling date / time	17-Mar-2021 14:01	17-Mar-2021 14:02	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EP2102902-001**	**EP2102902-002**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	**0.0008**	**----**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	**0.0008**	**----**	**----**	**----**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**96.0**	**91.0**	**----**	**----**	**----**
13C8-PFOA	----	0.0002	%	**92.5**	**87.0**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102902**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 19-Mar-2021
C-O-C number	: 20400	Issue Date	: 25-Mar-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

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The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3573756)									
EP2102888-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.2	9.3	0.00	0% - 20%
EP2102888-010	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.2	9.3	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3573755)									
EP2102888-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3040	3060	0.656	0% - 20%
EP2102888-010	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3300	3320	0.604	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3573767)									
EP2102888-001	Anonymous	EA055: Moisture Content	----	0.1	%	23.7	23.0	3.00	0% - 20%
EP2102888-010	Anonymous	EA055: Moisture Content	----	0.1	%	22.4	22.6	0.926	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3573751)									
EP2102882-011	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	9.4	9.4	0.00	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	16.1	16.3	1.23	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	1.8	1.9	0.00	0% - 50%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	1.9	1.9	0.00	0% - 50%
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	20.0	20.2	1.05	0% - 20%
EP2102888-009	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	5.2	# 3.8	30.9	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	2.7	2.8	4.72	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.4	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.1	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	3.2	3.3	0.00	0% - 20%
EP004: Organic Matter (QC Lot: 3573758)									
EP2102888-001	Anonymous	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit
EP2102888-011	Anonymous	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3578112)									
EP2102888-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	0.0005	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP2102888-011	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3578112)									
EP2102888-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP2102888-011	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3578112)									
EP2102888-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3578112) - continued									
EP2102888-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2102888-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3578112)									
EP2102888-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP2102888-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3573756)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3573755)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	93.6	106
ED008: Exchangeable Cations (QCLot: 3573751)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	87.5	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	89.4	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	96.9	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	95.8	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	88.1	79.9	110
EP004: Organic Matter (QCLot: 3573758)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	98.7	70.0	120
				<0.5	85 %	85.4	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3578112)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578112)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	103	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	111	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3578112)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3578112) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	107	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	107	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	108	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	108	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3578112)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	104	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	108	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	121	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	103	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3578112)							
EP2102888-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	113	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	108	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	113	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	106	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	122	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	117	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578112)							
EP2102888-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	105	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	114	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	111	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	113	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	120	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	116	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	119	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3578112) - continued							
EP2102888-001	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	115	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	110	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	118	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	112	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3578112)							
EP2102888-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	114	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	97.8	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	108	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	107	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	111	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	108	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	109	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3578112)							
EP2102888-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	112	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	110	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	106	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	96.8	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102902**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 17-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 25-Mar-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 2
Order number	: DEF19009/730	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
ED008: Exchangeable Cations	EP2102888--009	Anonymous	**Exchangeable Sodium Percent**	----	30.9 %	0% - 20%	**RPD exceeds LOR based limits**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002)								
0089_SD409_210317,	0089_SD366_210317	**17-Mar-2021**	**19-Mar-2021**	24-Mar-2021	✓	**19-Mar-2021**	19-Mar-2021	✓
EA010: Conductivity (1:5)								
Soil Glass Jar - Unpreserved (EA010)								
0089_SD409_210317,	0089_SD366_210317	**17-Mar-2021**	**19-Mar-2021**	24-Mar-2021	✓	**19-Mar-2021**	16-Apr-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
0089_SD409_210317,	0089_SD366_210317	**17-Mar-2021**	**----**	----	----	**19-Mar-2021**	31-Mar-2021	✓
ED008: Exchangeable Cations								
Soil Glass Jar - Unpreserved (ED008)								
0089_SD409_210317,	0089_SD366_210317	**17-Mar-2021**	**24-Mar-2021**	14-Apr-2021	✓	**24-Mar-2021**	14-Apr-2021	✓
EP004: Organic Matter								
Soil Glass Jar - Unpreserved (EP004)								
0089_SD409_210317,	0089_SD366_210317	**17-Mar-2021**	**23-Mar-2021**	14-Apr-2021	✓	**23-Mar-2021**	14-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0089_SD409_210317,	0089_SD366_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	01-May-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
0089_SD409_210317,	0089_SD366_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	01-May-2021	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X)								
0089_SD409_210317,	0089_SD366_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	01-May-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD409_210317, 0089_SD366_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	01-May-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD409_210317, 0089_SD366_210317	**17-Mar-2021**	**22-Mar-2021**	13-Sep-2021	✓	**24-Mar-2021**	01-May-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102902**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20400	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 17-Mar-2021 16:10	Issue Date	: 18-Mar-2021
Client Requested Due Date	: 29-Mar-2021	Scheduled Reporting Date	: **29-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 18.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 2 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2102902-001	17-Mar-2021 14:01	0089_SD409_210317	✓	✓	✓	✓
EP2102902-002	17-Mar-2021 14:02	0089_SD366_210317	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

COC#: **20400** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] DATE TIME: 17/3 1610	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD409		17/03/2021 02:01 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD366		17/03/2021 02:02 PM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division
Perth
Work Order Reference
EP2102902

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: **20400** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD409	HDPE Soil Jar	200 mL	00620719085941	Grey	No	
001	0089_SD409	Soil Glass Jar - Unpreserved	150 mL	00261020060151	Orange	No	
002	0089_SD366	Soil Glass Jar - Unpreserved	150 mL	00261020040845	Orange	No	
002	0089_SD366	HDPE Soil Jar	200 mL	00620719085934	Grey	No	

Total Bottle Count: ALS: 4, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102941**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 22-Mar-2021
C-O-C number	: 20434	Issue Date	: 30-Mar-2021 09:36
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW413_210318	----	----	----	----
				Sampling date / time	18-Mar-2021 10:32	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102941-003	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.62	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		42800	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		395	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		198	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		198	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2910	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19500	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		501	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1530	----	----	----	----
Sodium	7440-23-5	1	mg/L		11800	----	----	----	----
Potassium	7440-09-7	1	mg/L		638	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		615	----	----	----	----
ø Total Cations	----	0.01	meq/L		680	----	----	----	----
ø Ionic Balance	----	0.01	%		5.09	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		5	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW413_210318	----	----	----	----
			Sampling date / time		18-Mar-2021 10:32	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102941-003	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW413_210318	----	----	----	----
				Sampling date / time	18-Mar-2021 10:32	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102941-003	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**98.5**	----	----	----	----
13C8-PFOA	----	0.02	%		**99.5**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_PW415_210318	0089_SW416_210318	0089_SW414_210318	----	----
			Sampling date / time	18-Mar-2021 10:16	18-Mar-2021 10:21	18-Mar-2021 10:34	----	----
Compound	CAS Number	LOR	Unit	EP2102941-001	EP2102941-002	EP2102941-004	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.80	8.03	8.01	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	25500	42600	41800	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	64	9	61	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	143	114	107	----	----
Total Alkalinity as CaCO3	----	1	mg/L	143	114	107	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2080	2840	2760	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	12900	20200	19200	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	294	461	448	----	----
Magnesium	7439-95-4	1	mg/L	881	1470	1430	----	----
Sodium	7440-23-5	1	mg/L	7010	11400	11200	----	----
Potassium	7440-09-7	1	mg/L	392	608	598	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	410	631	601	----	----
ø Total Cations	----	0.01	meq/L	402	655	642	----	----
ø Ionic Balance	----	0.01	%	0.98	1.88	3.32	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	7	1	3	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW415_210318	0089_SW416_210318	0089_SW414_210318	----	----
				Sampling date / time	18-Mar-2021 10:16	18-Mar-2021 10:21	18-Mar-2021 10:34	----	----
Compound	CAS Number	LOR	Unit		EP2102941-001	EP2102941-002	EP2102941-004	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**0.04**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW415_210318	0089_SW416_210318	0089_SW414_210318	----	----
				Sampling date / time	18-Mar-2021 10:16	18-Mar-2021 10:21	18-Mar-2021 10:34	----	----
Compound	CAS Number	LOR	Unit		EP2102941-001	EP2102941-002	EP2102941-004	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.04**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.04**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.04**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	**97.6**	**99.6**	----	----
13C8-PFOA	----	0.02	%		**97.1**	**97.5**	**96.5**	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102941**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 22-Mar-2021
C-O-C number	: 20434	Issue Date	: 30-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA005P: pH by PC Titrator (QC Lot: 3588434)									
EP2102941-002	0089_SW416_210318	EA005-P: pH Value	----	0.01	pH Unit	8.03	8.01	0.249	0% - 20%
EP2102954-007	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.98	7.97	0.125	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3582343)									
EP2102941-001	0089_PW415_210318	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	25500	26200	2.70	0% - 20%
EP2103033-022	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	<10	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3582344)									
EP2102941-001	0089_PW415_210318	EA025H: Suspended Solids (SS)	----	5	mg/L	64	72	11.8	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3588433)									
EP2102941-002	0089_SW416_210318	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	114	112	1.64	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	114	112	1.64	0% - 20%
EP2102954-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	438	371	16.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	438	371	16.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3581679)									
EP2102941-001	0089_PW415_210318	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2080	2130	2.43	0% - 20%
EP2102955-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3581680)									
EP2102941-001	0089_PW415_210318	ED045G: Chloride	16887-00-6	1	mg/L	12900	12800	0.837	0% - 20%
EP2102955-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	20	20	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3577794)									
EP2102941-001	0089_PW415_210318	ED093F: Calcium	7440-70-2	1	mg/L	294	300	1.87	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3577794) - continued									
EP2102941-001	0089_PW415_210318	ED093F: Magnesium	7439-95-4	1	mg/L	881	906	2.78	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	7010	7130	1.65	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	392	400	1.99	0% - 20%
EP2102954-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	89	85	4.53	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	38	38	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	96	98	2.02	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	15	15	0.00	0% - 50%
EP005: Total Organic Carbon (TOC) (QC Lot: 3580611)									
EP2102892-009	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	8	7	0.00	No Limit
EP2102901-009	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3588434)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3582343)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	108	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3582344)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	119	89.1	120
				<5	1000 mg/L	98.6	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3588433)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	93.3	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3581679)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	108	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3581680)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.1	87.9	114
				<1	1000 mg/L	97.9	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3577794)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.0	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.4	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.2	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.1	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3580611)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	109	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3581742)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	116	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	113	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	119	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3581742) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	103	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	104	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3581742)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	120	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	112	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	115	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	120	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3581742)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	116	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	122	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	114	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	114	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	108	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	116	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	110	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3581742)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	118	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	121	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	117	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	98.0	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3581679)							
EP2102941-001	0089_PW415_210318	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3581680)							
EP2102941-001	0089_PW415_210318	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3580611)							
EP2102892-010	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	108	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102941**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 30-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 4
Order number	: DEF19009/730	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102941--001	0089_PW415_210318	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102941--001	0089_PW415_210318	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_PW415_210318,	0089_SW416_210318,	----	----	----	26-Mar-2021	18-Mar-2021	**8**
0089_PW413_210318,	0089_SW414_210318						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_PW415_210318,	0089_SW416_210318,	**18-Mar-2021**	**----**	----	----	**26-Mar-2021**	18-Mar-2021	×
0089_PW413_210318,	0089_SW414_210318							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_PW415_210318,	0089_SW416_210318,	**18-Mar-2021**	**----**	----	----	**24-Mar-2021**	25-Mar-2021	✓
0089_PW413_210318,	0089_SW414_210318							
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
0089_PW415_210318,	0089_SW416_210318,	**18-Mar-2021**	**----**	----	----	**24-Mar-2021**	25-Mar-2021	✓
0089_PW413_210318,	0089_SW414_210318							
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_PW415_210318,	0089_SW416_210318,	**18-Mar-2021**	**----**	----	----	**26-Mar-2021**	01-Apr-2021	✓
0089_PW413_210318,	0089_SW414_210318							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_PW415_210318,	0089_SW416_210318,	**18-Mar-2021**	**----**	----	----	**29-Mar-2021**	15-Apr-2021	✓
0089_PW413_210318,	0089_SW414_210318							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_PW415_210318,	0089_SW416_210318,	**18-Mar-2021**	**----**	----	----	**29-Mar-2021**	15-Apr-2021	✓
0089_PW413_210318,	0089_SW414_210318							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_PW415_210318,	0089_SW416_210318,	**18-Mar-2021**	**----**	----	----	**22-Mar-2021**	25-Mar-2021	✓
0089_PW413_210318,	0089_SW414_210318							
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005)								
0089_PW415_210318,	0089_SW416_210318,	**18-Mar-2021**	**----**	----	----	**23-Mar-2021**	15-Apr-2021	✓
0089_PW413_210318,	0089_SW414_210318							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_PW415_210318,	0089_SW416_210318,	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	14-Sep-2021	✓
0089_PW413_210318,	0089_SW414_210318							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0089_PW415_210318,	0089_SW416_210318,	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	14-Sep-2021	✓
0089_PW413_210318,	0089_SW414_210318							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW415_210318, 0089_SW416_210318, 0089_PW413_210318, 0089_SW414_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	14-Sep-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW415_210318, 0089_SW416_210318, 0089_PW413_210318, 0089_SW414_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	14-Sep-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW415_210318, 0089_SW416_210318, 0089_PW413_210318, 0089_SW414_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	14-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	4	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102941**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20434	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 19-Mar-2021 16:00	Issue Date	: 22-Mar-2021
Client Requested Due Date	: 31-Mar-2021	Scheduled Reporting Date	: **31-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 28.8 - Ice present
Receipt Detail	: Ice Melted	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102941-001	18-Mar-2021 10:16	0089_PW415_210318	✓	✓	✓	✓	✓	✓	✓
EP2102941-002	18-Mar-2021 10:21	0089_SW416_210318	✓	✓	✓	✓	✓	✓	✓
EP2102941-003	18-Mar-2021 10:32	0089_PW413_210318	✓	✓	✓	✓	✓	✓	✓
EP2102941-004	18-Mar-2021 10:34	0089_SW414_210318	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102941-001	18-Mar-2021 10:16	0089_PW415_210318	✓
EP2102941-002	18-Mar-2021 10:21	0089_SW416_210318	✓
EP2102941-003	18-Mar-2021 10:32	0089_PW413_210318	✓
EP2102941-004	18-Mar-2021 10:34	0089_SW414_210318	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
0089_PW413_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_PW415_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_SW414_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_SW416_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

COC#: **20434** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	[redacted]BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	[redacted] 19/3 1600	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW415		18/03/2021 10:16 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_SW416		18/03/2021 10:21 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_PW413		18/03/2021 10:32 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_SW414		18/03/2021 10:34 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2102941

Telephone : - 61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: **20434** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW415	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_SW416	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW413	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW414	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **20434** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW415	HDPE (no PTFE)	20 mL	00352010071144	Grey	No	
001	0089_PW415	HDPE (no PTFE)	20 mL	00352010071544	Grey	No	
001	0089_PW415	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001602	Purple	No	
001	0089_PW415	Clear Plastic Bottle - Natural	250 mL	00070719175461	Green	No	
002	0089_SW416	HDPE (no PTFE)	20 mL	00352010071465	Grey	No	
002	0089_SW416	HDPE (no PTFE)	20 mL	00352010071120	Grey	No	
002	0089_SW416	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049496	Purple	No	
002	0089_SW416	Clear Plastic Bottle - Natural	250 mL	00070719175530	Green	No	
003	0089_PW413	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001673	Purple	No	
003	0089_PW413	Clear Plastic Bottle - Natural	250 mL	00070719175447	Green	No	
003	0089_PW413	HDPE (no PTFE)	20 mL	00352010080812	Grey	No	
003	0089_PW413	HDPE (no PTFE)	20 mL	00352010071886	Grey	No	
004	0089_SW414	Clear Plastic Bottle - Natural	250 mL	00070719175474	Green	No	
004	0089_SW414	HDPE (no PTFE)	20 mL	00352010071106	Grey	No	
004	0089_SW414	HDPE (no PTFE)	20 mL	00352010071501	Grey	No	
004	0089_SW414	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001864	Purple	No	

Total Bottle Count: ALS: 16, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102942**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 25-Mar-2021
C-O-C number	: 20435	Issue Date	: 31-Mar-2021 13:54
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD415_210318	0089_SD413_210318	0089_SD411_210318	----	----
			Sampling date / time	18-Mar-2021 10:19	18-Mar-2021 10:29	18-Mar-2021 10:43	----	----
Compound	CAS Number	LOR	Unit	EP2102942-001	EP2102942-002	EP2102942-003	--------	--------
				Result	Result	Result	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.1**	**9.2**	**9.1**	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1950**	**2400**	**3250**	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**22.0**	**18.0**	**22.5**	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**3.1**	**2.6**	**2.9**	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.3**	**0.4**	**0.5**	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.1**	**0.2**	**0.2**	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**3.6**	**3.2**	**3.6**	----	----
Exchangeable Sodium Percent	----	0.1	%	**4.0**	**5.2**	**6.4**	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	**0.6**	**0.9**	**0.8**	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD415_210318	0089_SD413_210318	0089_SD411_210318	----	----
				Sampling date / time	18-Mar-2021 10:19	18-Mar-2021 10:29	18-Mar-2021 10:43	----	----
Compound	CAS Number	LOR	Unit		EP2102942-001	EP2102942-002	EP2102942-003	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)			Sample ID	**0089_SD415_210318**	**0089_SD413_210318**	**0089_SD411_210318**	**----**	**----**
			Sampling date / time	18-Mar-2021 10:19	18-Mar-2021 10:29	18-Mar-2021 10:43	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EP2102942-001**	**EP2102942-002**	**EP2102942-003**	**--------**	**--------**
				Result	Result	Result	----	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**----**	**----**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**95.5**	**84.0**	**112**	**----**	**----**
13C8-PFOA	----	0.0002	%	**106**	**104**	**102**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102942**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 25-Mar-2021
C-O-C number	: 20435	Issue Date	: 31-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA002: pH 1:5 (Soils) (QC Lot: 3584990)									
EP2102942-001	0089_SD415_210318	EA002: pH Value	----	0.1	pH Unit	9.1	9.2	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3584989)									
EP2102942-001	0089_SD415_210318	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	1950	1950	0.154	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3585012)									
EP2102942-001	0089_SD415_210318	EA055: Moisture Content	----	0.1	%	22.0	22.0	0.00	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3592092)									
EP2102942-001	0089_SD415_210318	ED008: Exchangeable Sodium Percent	----	0.1	%	4.0	4.4	8.86	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	3.1	3.0	4.04	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.3	0.3	0.00	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.1	0.2	0.00	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	3.6	3.5	3.09	0% - 20%
EP004: Organic Matter (QC Lot: 3587675)									
EP2102942-001	0089_SD415_210318	EP004: Organic Matter	----	0.5	%	0.6	0.8	30.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3587506)									
EP2102942-001	0089_SD415_210318	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3587506)									
EP2102942-001	0089_SD415_210318	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3587506) - continued									
EP2102942-001	0089_SD415_210318	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3587506)									
EP2102942-001	0089_SD415_210318	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3587506)									
EP2102942-001	0089_SD415_210318	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3584990)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3584989)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.9	93.6	106
ED008: Exchangeable Cations (QCLot: 3592092)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	78.9	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	86.6	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	96.2	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	96.6	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	80.3	79.9	110
EP004: Organic Matter (QCLot: 3587675)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	109	70.0	120
				<0.5	85 %	86.1	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3587506)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3587506)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	105	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	119	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	126	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.4	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	122	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3587506)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3587506) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	118	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	127	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	114	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	119	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	125	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3587506)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	114	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	91.6	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	110	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3587506)							
EP2102942-001	0089_SD415_210318	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	104	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	122	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	113	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	118	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	122	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	81.2	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3587506)							
EP2102942-001	0089_SD415_210318	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	104	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	103	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	124	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	114	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	122	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	122	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	121	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3587506) - continued							
EP2102942-001	0089_SD415_210318	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	95.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	84.4	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	74.8	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	127	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3587506)							
EP2102942-001	0089_SD415_210318	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	109	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	122	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	128	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	118	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	110	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	120	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	122	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3587506)							
EP2102942-001	0089_SD415_210318	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	115	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	123	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	92.4	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	103	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102942**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 31-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 3
Order number	: DEF19009/730	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD415_210318, 0089_SD413_210318, 0089_SD411_210318	**18-Mar-2021**	**25-Mar-2021**	25-Mar-2021	✓	**25-Mar-2021**	25-Mar-2021	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD415_210318, 0089_SD413_210318, 0089_SD411_210318	**18-Mar-2021**	**25-Mar-2021**	25-Mar-2021	✓	**25-Mar-2021**	22-Apr-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD415_210318, 0089_SD413_210318, 0089_SD411_210318	**18-Mar-2021**	**----**	----	----	**25-Mar-2021**	01-Apr-2021	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD415_210318, 0089_SD413_210318, 0089_SD411_210318	**18-Mar-2021**	**29-Mar-2021**	15-Apr-2021	✓	**29-Mar-2021**	15-Apr-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD415_210318, 0089_SD413_210318, 0089_SD411_210318	**18-Mar-2021**	**29-Mar-2021**	15-Apr-2021	✓	**29-Mar-2021**	15-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD415_210318, 0089_SD413_210318, 0089_SD411_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	05-May-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD415_210318, 0089_SD413_210318, 0089_SD411_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	05-May-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD415_210318, 0089_SD413_210318, 0089_SD411_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	05-May-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD415_210318, 0089_SD413_210318, 0089_SD411_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	05-May-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD415_210318, 0089_SD413_210318, 0089_SD411_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	05-May-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	3	**66.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	4	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102942**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20435	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 19-Mar-2021 16:00	Issue Date	: 22-Mar-2021
Client Requested Due Date	: 31-Mar-2021	Scheduled Reporting Date	: **31-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 28.8 - Ice present
Receipt Detail	: Ice Melted	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2102942-001	18-Mar-2021 10:19	0089_SD415_210318	✓	✓	✓	✓
EP2102942-002	18-Mar-2021 10:29	0089_SD413_210318	✓	✓	✓	✓
EP2102942-003	18-Mar-2021 10:43	0089_SD411_210318	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

COC#: **20435** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted]:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 19/3 1100	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD415		18/03/2021 10:19 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD413		18/03/2021 10:29 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD411		18/03/2021 10:43 AM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division
Perth
Work Order Reference
EP2102942

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: **20435** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD415	HDPE Soil Jar	200 mL	00620719085716	Grey	No	
001	0089_SD415	Soil Glass Jar - Unpreserved	150 mL	00261020040782	Orange	No	
002	0089_SD413	HDPE Soil Jar	200 mL	00620719085964	Grey	No	
002	0089_SD413	Soil Glass Jar - Unpreserved	150 mL	00261020059944	Orange	No	
003	0089_SD411	HDPE Soil Jar	200 mL	00620719085998	Grey	No	
003	0089_SD411	Soil Glass Jar - Unpreserved	150 mL	00261020040850	Orange	No	

Total Bottle Count: ALS: 6, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102954**	Page	: 1 of 14
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 22-Mar-2021
C-O-C number	: 20414	Issue Date	: 31-Mar-2021 12:21
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 16		
No. of samples analysed	: 16		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW242_210318	0089_MW248_210318	0089_MW516_210318	0089_MW517_210318	0089_MW257_210318
			Sampling date / time	18-Mar-2021 08:37	18-Mar-2021 08:51	18-Mar-2021 08:53	18-Mar-2021 09:04	18-Mar-2021 09:14
Compound	CAS Number	LOR	Unit	EP2102954-001	EP2102954-002	EP2102954-003	EP2102954-004	EP2102954-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.10	7.89	7.76	7.88	8.10
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	283	1060	738	398	334
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	82	<5	54	306	70
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	183	437	460	246	193
Total Alkalinity as CaCO3	----	1	mg/L	183	437	460	246	193
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	28	253	28	4	14
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	25	164	131	76	43
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	72	133	144	82	74
Magnesium	7439-95-4	1	mg/L	12	53	33	9	8
Sodium	7440-23-5	1	mg/L	18	163	89	58	30
Potassium	7440-09-7	1	mg/L	2	21	12	2	4
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	4.94	18.6	13.5	7.14	5.36
ø Total Cations	----	0.01	meq/L	5.41	18.6	14.1	7.41	5.76
ø Ionic Balance	----	0.01	%	4.54	<0.01	2.22	1.82	3.58
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	5	16	25	10	4
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.15	0.08	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.12	0.08	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	1.34	1.61	<0.02	0.06
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.05	0.15	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW242_210318	0089_MW248_210318	0089_MW516_210318	0089_MW517_210318	0089_MW257_210318
				Sampling date / time	18-Mar-2021 08:37	18-Mar-2021 08:51	18-Mar-2021 08:53	18-Mar-2021 09:04	18-Mar-2021 09:14
Compound	CAS Number	LOR	Unit		EP2102954-001	EP2102954-002	EP2102954-003	EP2102954-004	EP2102954-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.03**	**0.44**	**11.0**	**0.01**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	**0.8**	**1.1**	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.04**	**0.03**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.30**	**0.24**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.05**	**0.04**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.10**	**0.15**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW242_210318	0089_MW248_210318	0089_MW516_210318	0089_MW517_210318	0089_MW257_210318
				Sampling date / time	18-Mar-2021 08:37	18-Mar-2021 08:51	18-Mar-2021 08:53	18-Mar-2021 09:04	18-Mar-2021 09:14
Compound	CAS Number	LOR	Unit		EP2102954-001	EP2102954-002	EP2102954-003	EP2102954-004	EP2102954-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.03**	**3.39**	**14.5**	**0.01**	**0.06**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.03**	**1.78**	**12.6**	**0.01**	**0.06**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.03**	**3.22**	**14.2**	**0.01**	**0.06**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**101**	**103**	**101**	**102**	**102**
13C8-PFOA	----	0.02	%		**96.0**	**97.9**	**98.6**	**99.8**	**97.6**

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW259_210318	0089_MW264_210318	0089_MW518_210318	0089_MW010_210318	0089_MW261_210318
				Sampling date / time	18-Mar-2021 09:29	18-Mar-2021 09:40	18-Mar-2021 09:50	18-Mar-2021 10:03	18-Mar-2021 10:10
					EP2102954-006	EP2102954-007	EP2102954-008	EP2102954-009	EP2102954-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.94**	**7.98**	**8.02**	**7.84**	**7.91**
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**303**	**624**	**1440**	**1510**	**1670**
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**220**	**91**	**308**	**24**	**33**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**206**	**438**	**320**	**396**	**396**
Total Alkalinity as CaCO3	----	1	mg/L		**206**	**438**	**320**	**396**	**396**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**17**	**62**	**151**	**136**	**168**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**33**	**108**	**504**	**605**	**668**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**75**	**89**	**123**	**109**	**145**
Magnesium	7439-95-4	1	mg/L		**13**	**38**	**66**	**62**	**61**
Sodium	7440-23-5	1	mg/L		**26**	**96**	**246**	**356**	**372**
Potassium	7440-09-7	1	mg/L		**2**	**15**	**18**	**26**	**28**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**5.40**	**13.1**	**23.8**	**27.8**	**30.2**
ø Total Cations	----	0.01	meq/L		**5.99**	**12.1**	**22.7**	**26.7**	**29.2**
ø Ionic Balance	----	0.01	%		**5.21**	**3.81**	**2.20**	**2.05**	**1.85**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**9**	**6**	**10**	**15**	**14**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.02**	<0.02	**0.02**	<0.02	**0.03**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.02**	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**0.08**	**0.05**	**0.02**	**0.06**	**0.26**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW259_210318	0089_MW264_210318	0089_MW518_210318	0089_MW010_210318	0089_MW261_210318
				Sampling date / time	18-Mar-2021 09:29	18-Mar-2021 09:40	18-Mar-2021 09:50	18-Mar-2021 10:03	18-Mar-2021 10:10
Compound	CAS Number	LOR	Unit		EP2102954-006	EP2102954-007	EP2102954-008	EP2102954-009	EP2102954-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.36**	**1.30**	<0.01	**0.02**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.07**	**0.02**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.13**	**0.02**	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.02**	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW259_210318	0089_MW264_210318	0089_MW518_210318	0089_MW010_210318	0089_MW261_210318
				Sampling date / time	18-Mar-2021 09:29	18-Mar-2021 09:40	18-Mar-2021 09:50	18-Mar-2021 10:03	18-Mar-2021 10:10
Compound	CAS Number	LOR	Unit		EP2102954-006	EP2102954-007	EP2102954-008	EP2102954-009	EP2102954-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.70**	**1.39**	**0.04**	**0.08**	**0.29**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.44**	**1.35**	**0.02**	**0.08**	**0.26**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.68**	**1.39**	**0.04**	**0.08**	**0.29**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.8**	**100**	**93.8**	**104**	**102**
13C8-PFOA	----	0.02	%		**98.8**	**98.7**	**94.7**	**96.8**	**97.5**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW240_210318	0089_MW239_210318	0089_QC301_210318	0089_QC401_210318	0089_QC302_210318
			Sampling date / time	18-Mar-2021 13:01	18-Mar-2021 13:02	18-Mar-2021 13:07	18-Mar-2021 13:08	18-Mar-2021 13:08
Compound	CAS Number	LOR	Unit	EP2102954-011	EP2102954-012	EP2102954-013	EP2102954-014	EP2102954-015
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.03	8.13	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	650	400	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	241	19	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	241	217	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	241	217	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	51	81	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	78	30	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	131	88	----	----	----
Magnesium	7439-95-4	1	mg/L	14	22	----	----	----
Sodium	7440-23-5	1	mg/L	36	27	----	----	----
Potassium	7440-09-7	1	mg/L	4	4	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	8.08	6.87	----	----	----
ø Total Cations	----	0.01	meq/L	9.36	7.48	----	----	----
ø Ionic Balance	----	0.01	%	7.34	4.25	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	6	4	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	0.04	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.08	0.07	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	3.26	0.04	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.20	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW240_210318	0089_MW239_210318	0089_QC301_210318	0089_QC401_210318	0089_QC302_210318
				Sampling date / time	18-Mar-2021 13:01	18-Mar-2021 13:02	18-Mar-2021 13:07	18-Mar-2021 13:08	18-Mar-2021 13:08
Compound	CAS Number	LOR	Unit		EP2102954-011	EP2102954-012	EP2102954-013	EP2102954-014	EP2102954-015
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.02**	**0.02**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.18**	**0.08**	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.03**	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.30**	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW240_210318	0089_MW239_210318	0089_QC301_210318	0089_QC401_210318	0089_QC302_210318
				Sampling date / time	18-Mar-2021 13:01	18-Mar-2021 13:02	18-Mar-2021 13:07	18-Mar-2021 13:08	18-Mar-2021 13:08
Compound	CAS Number	LOR	Unit		EP2102954-011	EP2102954-012	EP2102954-013	EP2102954-014	EP2102954-015
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**4.09**	**0.25**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**3.26**	**0.04**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**3.81**	**0.18**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**100**	**99.3**	**94.9**	**104**	**94.5**
13C8-PFOA	----	0.02	%		**98.5**	**97.2**	**98.4**	**97.7**	**99.3**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC402_210318	----	----	----	----
			Sampling date / time		18-Mar-2021 13:09	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102954-016	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC402_210318	----	----	----	----
				Sampling date / time	18-Mar-2021 13:09	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102954-016	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	----	----	----	----
13C8-PFOA	----	0.02	%		**90.7**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102954**	Page	: 1 of 10
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 22-Mar-2021
C-O-C number	: 20414	Issue Date	: 31-Mar-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 16		
No. of samples analysed	: 16		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3588434)									
EP2102941-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.03	8.01	0.249	0% - 20%
EP2102954-007	0089_MW264_210318	EA005-P: pH Value	----	0.01	pH Unit	7.98	7.97	0.125	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3582322)									
EP2102954-001	0089_MW242_210318	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	283	292	2.96	0% - 20%
EP2102954-009	0089_MW010_210318	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1510	1500	0.996	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3582323)									
EP2102954-001	0089_MW242_210318	EA025H: Suspended Solids (SS)	----	5	mg/L	82	79	4.02	0% - 50%
EP2102954-011	0089_MW240_210318	EA025H: Suspended Solids (SS)	----	5	mg/L	241	231	4.13	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3588433)									
EP2102941-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	114	112	1.64	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	114	112	1.64	0% - 20%
EP2102954-007	0089_MW264_210318	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	438	371	16.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	438	371	16.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3578930)									
EP2102954-001	0089_MW242_210318	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	28	27	0.00	0% - 20%
EP2102954-011	0089_MW240_210318	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	51	52	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3578931)									
EP2102954-001	0089_MW242_210318	ED045G: Chloride	16887-00-6	1	mg/L	25	25	0.00	0% - 20%
EP2102954-011	0089_MW240_210318	ED045G: Chloride	16887-00-6	1	mg/L	78	80	2.38	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3577794)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3577794) - continued									
EP2102941-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	294	300	1.87	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	881	906	2.78	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	7010	7130	1.65	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	392	400	1.99	0% - 20%
EP2102954-007	0089_MW264_210318	ED093F: Calcium	7440-70-2	1	mg/L	89	85	4.53	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	38	38	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	96	98	2.02	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	15	15	0.00	0% - 50%
EP005: Total Organic Carbon (TOC) (QC Lot: 3586006)									
EP2102954-001	0089_MW242_210318	EP005: Total Organic Carbon	----	1	mg/L	5	4	25.4	No Limit
EP2102954-011	0089_MW240_210318	EP005: Total Organic Carbon	----	1	mg/L	6	8	23.9	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES2110646-003	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.08	0.08	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.05	63.5	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.22	0.24	10.3	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.1	0.1	0.00	No Limit
ES2110646-003	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.11	0.10	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.29	0.29	0.00	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.02	0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3588126) - continued									
ES2110646-003	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.1	0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2110646-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	2.14	2.03	5.45	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3588126) - continued									
ES2110646-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2110646-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	1.56	1.55	0.939	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.63	2.56	2.70	0% - 20%
ES2110646-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.15	2.13	0.934	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3588434)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3582322)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114
				<10	1000 mg/L	100	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3582323)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	113	89.1	120
				<5	1000 mg/L	98.0	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3588433)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	93.3	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3578930)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.4	87.7	113
				<1	500 mg/L	102	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3578931)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3577794)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.0	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.4	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.2	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.1	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3586006)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	108	87.2	116
				<1	100 mg/L	105	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3581742)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	116	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	113	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	119	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3581742) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	103	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	104	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3588126)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	97.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	109	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	105	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	117	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	90.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	120	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3581742)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	120	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	112	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	115	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	120	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3588126)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	101	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	113	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	125	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	126	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	117	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3581742)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	116	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	122	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	114	62.6	147

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3581742) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	114	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	108	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	116	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	110	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3588126)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	113	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	85.3	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	95.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	96.9	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	118	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	127	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3581742)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	118	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	121	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	117	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	98.0	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3588126)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	105	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	109	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	126	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	111	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3578930)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3578930) - continued							
EP2102954-001	0089_MW242_210318	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	99.3	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3578931)							
EP2102954-001	0089_MW242_210318	ED045G: Chloride	16887-00-6	1000 mg/L	99.4	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3586006)							
EP2102954-002	0089_MW248_210318	EP005: Total Organic Carbon	----	100 mg/L	104	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3588126)							
ES2110646-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	100	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	104	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	118	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	126	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	101	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	126	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3588126)							
ES2110646-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	104	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	103	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	121	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	129	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	129	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	128	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	118	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	121	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	129	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	125	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	118	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3588126)							
ES2110646-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	117	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	108	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	85.6	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	104	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	117	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	115	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	126	61.0	135

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3588126)							
ES2110646-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	88.8	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	89.9	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	119	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	90.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102954**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 31-Mar-2021
Sampler	: [redacted]	No. of samples received	: 16
Order number	: DEF19009/730	No. of samples analysed	: 16

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW242_210318,	0089_MW248_210318,	----	----	----	26-Mar-2021	18-Mar-2021	**8**
0089_MW516_210318,	0089_MW517_210318,						
0089_MW257_210318,	0089_MW259_210318,						
0089_MW264_210318,	0089_MW518_210318,						
0089_MW010_210318,	0089_MW261_210318,						
0089_MW240_210318,	0089_MW239_210318						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	39	5.13	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	39	2.56	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_MW242_210318,	0089_MW248_210318,	**18-Mar-2021**	**----**	----	----	**26-Mar-2021**	18-Mar-2021	×
0089_MW516_210318,	0089_MW517_210318,							
0089_MW257_210318,	0089_MW259_210318,							
0089_MW264_210318,	0089_MW518_210318,							
0089_MW010_210318,	0089_MW261_210318,							
0089_MW240_210318,	0089_MW239_210318							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_MW242_210318,	0089_MW248_210318,	**18-Mar-2021**	**----**	----	----	**24-Mar-2021**	25-Mar-2021	✓
0089_MW516_210318,	0089_MW517_210318,							
0089_MW257_210318,	0089_MW259_210318,							
0089_MW264_210318,	0089_MW518_210318,							
0089_MW010_210318,	0089_MW261_210318,							
0089_MW240_210318,	0089_MW239_210318							
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
0089_MW242_210318,	0089_MW248_210318,	**18-Mar-2021**	**----**	----	----	**24-Mar-2021**	25-Mar-2021	✓
0089_MW516_210318,	0089_MW517_210318,							
0089_MW257_210318,	0089_MW259_210318,							
0089_MW264_210318,	0089_MW518_210318,							
0089_MW010_210318,	0089_MW261_210318,							
0089_MW240_210318,	0089_MW239_210318							
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_MW242_210318,	0089_MW248_210318,	**18-Mar-2021**	**----**	----	----	**26-Mar-2021**	01-Apr-2021	✓
0089_MW516_210318,	0089_MW517_210318,							
0089_MW257_210318,	0089_MW259_210318,							
0089_MW264_210318,	0089_MW518_210318,							
0089_MW010_210318,	0089_MW261_210318,							
0089_MW240_210318,	0089_MW239_210318							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_MW242_210318,	0089_MW248_210318,	**18-Mar-2021**	**----**	----	----	**25-Mar-2021**	15-Apr-2021	✓
0089_MW516_210318,	0089_MW517_210318,							
0089_MW257_210318,	0089_MW259_210318,							
0089_MW264_210318,	0089_MW518_210318,							
0089_MW010_210318,	0089_MW261_210318,							
0089_MW240_210318,	0089_MW239_210318							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_MW242_210318,	0089_MW248_210318,	**18-Mar-2021**	**----**	----	----	**25-Mar-2021**	15-Apr-2021	✓
0089_MW516_210318,	0089_MW517_210318,							
0089_MW257_210318,	0089_MW259_210318,							
0089_MW264_210318,	0089_MW518_210318,							
0089_MW010_210318,	0089_MW261_210318,							
0089_MW240_210318,	0089_MW239_210318							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW242_210318, 0089_MW248_210318, 0089_MW516_210318, 0089_MW517_210318, 0089_MW257_210318, 0089_MW259_210318, 0089_MW264_210318, 0089_MW518_210318, 0089_MW010_210318, 0089_MW261_210318, 0089_MW240_210318, 0089_MW239_210318	**18-Mar-2021**	**----**	----	----	**22-Mar-2021**	25-Mar-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW242_210318, 0089_MW248_210318, 0089_MW516_210318, 0089_MW517_210318, 0089_MW257_210318, 0089_MW259_210318, 0089_MW264_210318, 0089_MW518_210318, 0089_MW010_210318, 0089_MW261_210318, 0089_MW240_210318, 0089_MW239_210318	**18-Mar-2021**	**----**	----	----	**25-Mar-2021**	15-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW242_210318, 0089_MW248_210318, 0089_MW516_210318, 0089_MW517_210318, 0089_MW257_210318, 0089_MW259_210318, 0089_MW264_210318, 0089_MW518_210318, 0089_MW010_210318, 0089_MW261_210318, 0089_MW240_210318, 0089_MW239_210318, 0089_QC301_210318, 0089_QC401_210318, 0089_QC302_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	14-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC402_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW242_210318, 0089_MW248_210318, 0089_MW516_210318, 0089_MW517_210318, 0089_MW257_210318, 0089_MW259_210318, 0089_MW264_210318, 0089_MW518_210318, 0089_MW010_210318, 0089_MW261_210318, 0089_MW240_210318, 0089_MW239_210318, 0089_QC301_210318, 0089_QC401_210318, 0089_QC302_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	14-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC402_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW242_210318, 0089_MW248_210318, 0089_MW516_210318, 0089_MW517_210318, 0089_MW257_210318, 0089_MW259_210318, 0089_MW264_210318, 0089_MW518_210318, 0089_MW010_210318, 0089_MW261_210318, 0089_MW240_210318, 0089_MW239_210318, 0089_QC301_210318, 0089_QC401_210318, 0089_QC302_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	14-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC402_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW242_210318, 0089_MW248_210318, 0089_MW516_210318, 0089_MW517_210318, 0089_MW257_210318, 0089_MW259_210318, 0089_MW264_210318, 0089_MW518_210318, 0089_MW010_210318, 0089_MW261_210318, 0089_MW240_210318, 0089_MW239_210318, 0089_QC301_210318, 0089_QC401_210318, 0089_QC302_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	14-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC402_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW242_210318, 0089_MW248_210318, 0089_MW516_210318, 0089_MW517_210318, 0089_MW257_210318, 0089_MW259_210318, 0089_MW264_210318, 0089_MW518_210318, 0089_MW010_210318, 0089_MW261_210318, 0089_MW240_210318, 0089_MW239_210318, 0089_QC301_210318, 0089_QC401_210318, 0089_QC302_210318	**18-Mar-2021**	**26-Mar-2021**	14-Sep-2021	✓	**26-Mar-2021**	14-Sep-2021	✓
HDPE (no PTFE) (EP231X)							
0089_QC402_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	39	**2.56**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102954**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20414	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 19-Mar-2021 16:00	Issue Date	: 22-Mar-2021
Client Requested Due Date	: 31-Mar-2021	Scheduled Reporting Date	: **31-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 28.8 - Ice present
Receipt Detail	: Ice Melted	No. of samples received / analysed	: 16 / 16

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102954-001	18-Mar-2021 08:37	0089_MW242_210318	✓	✓	✓	✓	✓	✓	✓
EP2102954-002	18-Mar-2021 08:51	0089_MW248_210318	✓	✓	✓	✓	✓	✓	✓
EP2102954-003	18-Mar-2021 08:53	0089_MW516_210318	✓	✓	✓	✓	✓	✓	✓
EP2102954-004	18-Mar-2021 09:04	0089_MW517_210318	✓	✓	✓	✓	✓	✓	✓
EP2102954-005	18-Mar-2021 09:14	0089_MW257_210318	✓	✓	✓	✓	✓	✓	✓
EP2102954-006	18-Mar-2021 09:29	0089_MW259_210318	✓	✓	✓	✓	✓	✓	✓
EP2102954-007	18-Mar-2021 09:40	0089_MW264_210318	✓	✓	✓	✓	✓	✓	✓
EP2102954-008	18-Mar-2021 09:50	0089_MW518_210318	✓	✓	✓	✓	✓	✓	✓
EP2102954-009	18-Mar-2021 10:03	0089_MW010_210318	✓	✓	✓	✓	✓	✓	✓
EP2102954-010	18-Mar-2021 10:10	0089_MW261_210318	✓	✓	✓	✓	✓	✓	✓
EP2102954-011	18-Mar-2021 13:01	0089_MW240_210318	✓	✓	✓	✓	✓	✓	✓
EP2102954-012	18-Mar-2021 13:02	0089_MW239_210318	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102954-001	18-Mar-2021 08:37	0089_MW242_210318	✓
EP2102954-002	18-Mar-2021 08:51	0089_MW248_210318	✓
EP2102954-003	18-Mar-2021 08:53	0089_MW516_210318	✓
EP2102954-004	18-Mar-2021 09:04	0089_MW517_210318	✓
EP2102954-005	18-Mar-2021 09:14	0089_MW257_210318	✓
EP2102954-006	18-Mar-2021 09:29	0089_MW259_210318	✓
EP2102954-007	18-Mar-2021 09:40	0089_MW264_210318	✓
EP2102954-008	18-Mar-2021 09:50	0089_MW518_210318	✓
EP2102954-009	18-Mar-2021 10:03	0089_MW010_210318	✓
EP2102954-010	18-Mar-2021 10:10	0089_MW261_210318	✓
EP2102954-011	18-Mar-2021 13:01	0089_MW240_210318	✓
EP2102954-012	18-Mar-2021 13:02	0089_MW239_210318	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102954-013	18-Mar-2021 13:07	0089_QC301_210318	✓
EP2102954-014	18-Mar-2021 13:08	0089_QC401_210318	✓
EP2102954-015	18-Mar-2021 13:08	0089_QC302_210318	✓
EP2102954-016	18-Mar-2021 13:09	0089_QC402_210318	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
0089_MW010_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW239_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW240_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW242_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW248_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW257_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW259_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW261_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW264_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW516_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW517_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW518_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

ALS COC#: **20414** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 19/3 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW242		18/03/2021 08:37 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
002	0089_MW248		18/03/2021 08:51 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
003	0089_MW516		18/03/2021 08:53 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
004	0089_MW517		18/03/2021 09:04 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
005	0089_MW257		18/03/2021 09:14 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
006	0089_MW259		18/03/2021 09:29 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
007	0089_MW264		18/03/2021 09:40 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
008	0089_MW518		18/03/2021 09:50 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
009	0089_MW010		18/03/2021 10:03 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		

Environmental Division
Perth
Work Order Reference
EP2102954

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: **20414** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW261		18/03/2021 10:10 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
011	0089_MW240		18/03/2021 01:01 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
012	0089_MW239		18/03/2021 01:02 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8		X		
013	0089_QC301		18/03/2021 01:07 PM	Water	ALS: 2 Non ALS: 0	No		X			
014	0089_QC401		18/03/2021 01:08 PM	Water	ALS: 2 Non ALS: 0	No		X			
015	0089_QC302		18/03/2021 01:08 PM	Water	ALS: 2 Non ALS: 0	No		X			
016	0089_QC402		18/03/2021 01:09 PM	Water	ALS: 2 Non ALS: 0	No		X			

CHAIN OF CUSTODY

COC#: **20414** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW242	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW248	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW516	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW517	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW257	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **20414** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW259	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW264	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW518	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_MW010	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_MW261	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_MW240	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **20414** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

012	0089_MW239	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 20414 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW242	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049574	Purple	No	
001	0089_MW242	HDPE (no PTFE)	20 mL	00352010071660	Grey	No	
001	0089_MW242	HDPE (no PTFE)	20 mL	00352010071524	Grey	No	
001	0089_MW242	Clear Plastic Bottle - Natural	250 mL	00070719175496	Green	No	
002	0089_MW248	Clear Plastic Bottle - Natural	250 mL	00070719175554	Green	No	
002	0089_MW248	HDPE (no PTFE)	20 mL	00352010071557	Grey	No	
002	0089_MW248	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049476	Purple	No	
002	0089_MW248	HDPE (no PTFE)	20 mL	00352010071177	Grey	No	
003	0089_MW516	Clear Plastic Bottle - Natural	250 mL	00070719175662	Green	No	
003	0089_MW516	HDPE (no PTFE)	20 mL	00352010071576	Grey	No	
003	0089_MW516	HDPE (no PTFE)	20 mL	00352010071605	Grey	No	
003	0089_MW516	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049514	Purple	No	
004	0089_MW517	Clear Plastic Bottle - Natural	250 mL	00070719175431	Green	No	
004	0089_MW517	HDPE (no PTFE)	20 mL	00352010071197	Grey	No	
004	0089_MW517	HDPE (no PTFE)	20 mL	00352010080764	Grey	No	
004	0089_MW517	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001678	Purple	No	
005	0089_MW257	Clear Plastic Bottle - Natural	250 mL	00070719175523	Green	No	
005	0089_MW257	HDPE (no PTFE)	20 mL	00352010071520	Grey	No	
005	0089_MW257	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049528	Purple	No	
005	0089_MW257	HDPE (no PTFE)	20 mL	00352010071137	Grey	No	
006	0089_MW259	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049483	Purple	No	
006	0089_MW259	Clear Plastic Bottle - Natural	250 mL	00070719175587	Green	No	
006	0089_MW259	HDPE (no PTFE)	20 mL	00352010071632	Grey	No	
006	0089_MW259	HDPE (no PTFE)	20 mL	00352010071656	Grey	No	
007	0089_MW264	Clear Plastic Bottle - Natural	250 mL	00070719175524	Green	No	
007	0089_MW264	HDPE (no PTFE)	20 mL	00352010071272	Grey	No	

CHAIN OF CUSTODY

COC#: **20414** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_MW264	HDPE (no PTFE)	20 mL	00352010071182	Grey	No	
007	0089_MW264	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049509	Purple	No	
008	0089_MW518	Clear Plastic Bottle - Natural	250 mL	00070719175445	Green	No	
008	0089_MW518	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001830	Purple	No	
008	0089_MW518	HDPE (no PTFE)	20 mL	00352005006655	Grey	No	
008	0089_MW518	HDPE (no PTFE)	20 mL	00352010071551	Grey	No	
009	0089_MW010	Clear Plastic Bottle - Natural	250 mL	00070719175435	Green	No	
009	0089_MW010	HDPE (no PTFE)	20 mL	00352010080517	Grey	No	
009	0089_MW010	HDPE (no PTFE)	20 mL	00352010071911	Grey	No	
009	0089_MW010	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001825	Purple	No	
010	0089_MW261	Clear Plastic Bottle - Natural	250 mL	00070719175460	Green	No	
010	0089_MW261	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001867	Purple	No	
010	0089_MW261	HDPE (no PTFE)	20 mL	00352010071277	Grey	No	
010	0089_MW261	HDPE (no PTFE)	20 mL	00352010071364	Grey	No	
011	0089_MW240	Clear Plastic Bottle - Natural	250 mL	00070719175541	Green	No	
011	0089_MW240	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049457	Purple	No	
011	0089_MW240	HDPE (no PTFE)	20 mL	00352010071517	Grey	No	
011	0089_MW240	HDPE (no PTFE)	20 mL	00352010071151	Grey	No	
011	0089_MW240	HDPE (no PTFE)	20 mL	00352010071279	Grey	No	
012	0089_MW239	Clear Plastic Bottle - Natural	250 mL	00070719175533	Green	No	
012	0089_MW239	HDPE (no PTFE)	20 mL	00352010071536	Grey	No	
012	0089_MW239	HDPE (no PTFE)	20 mL	00352010071245	Grey	No	
012	0089_MW239	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049497	Purple	No	
013	0089_QC301	HDPE (no PTFE)	20 mL	00352010080758	Grey	No	
013	0089_QC301	HDPE (no PTFE)	20 mL	00352010071812	Grey	No	
014	0089_QC401	HDPE (no PTFE)	20 mL	00352010071223	Grey	No	
014	0089_QC401	HDPE (no PTFE)	20 mL	00352010071492	Grey	No	

CHAIN OF CUSTODY

COC#: **20414** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER: [redacted]

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

015	0089_QC302	HDPE (no PTFE)	20 mL	00352010080651	Grey	No	
015	0089_QC302	HDPE (no PTFE)	20 mL	00352010080770	Grey	No	
016	0089_QC402	HDPE (no PTFE)	20 mL	00352010071211	Grey	No	
016	0089_QC402	HDPE (no PTFE)	20 mL	00352010071129	Grey	No	

Total Bottle Count: ALS: 57, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102955**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 22-Mar-2021
C-O-C number	: 20430	Issue Date	: 31-Mar-2021 12:21
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW217_210318	0089_MW224_210318	0089_MW282_210318	0089_MW216_210318	0089_MW243_210318
				Sampling date / time	18-Mar-2021 09:28	18-Mar-2021 09:29	18-Mar-2021 09:35	18-Mar-2021 09:37	18-Mar-2021 12:33
					EP2102955-001	EP2102955-002	EP2102955-003	EP2102955-004	EP2102955-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.98**	**8.10**	**7.60**	**7.79**	**8.15**
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**355**	**482**	**872**	**1070**	**550**
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**78**	**216**	**883**	**486**	**20**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**292**	**214**	**632**	**318**	**263**
Total Alkalinity as CaCO3	----	1	mg/L		**292**	**214**	**632**	**318**	**263**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**18**	**38**	**17**	**80**	**58**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**39**	**114**	**102**	**309**	**63**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**93**	**63**	**222**	**135**	**122**
Magnesium	7439-95-4	1	mg/L		**9**	**20**	**33**	**40**	**18**
Sodium	7440-23-5	1	mg/L		**32**	**85**	**68**	**144**	**38**
Potassium	7440-09-7	1	mg/L		**3**	**4**	<1	**8**	**6**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**7.31**	**8.28**	**15.8**	**16.7**	**8.24**
ø Total Cations	----	0.01	meq/L		**6.85**	**8.59**	**16.8**	**16.5**	**9.38**
ø Ionic Balance	----	0.01	%		**3.24**	**1.82**	**2.74**	**0.72**	**6.45**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**3**	**4**	**8**	**6**	**5**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	**2.77**	**0.34**	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	**4.76**	**0.41**	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	**45.8**	**3.75**	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	**5.61**	**0.11**	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW217_210318	0089_MW224_210318	0089_MW282_210318	0089_MW216_210318	0089_MW243_210318
				Sampling date / time	18-Mar-2021 09:28	18-Mar-2021 09:29	18-Mar-2021 09:35	18-Mar-2021 09:37	18-Mar-2021 12:33
Compound	CAS Number	LOR	Unit		EP2102955-001	EP2102955-002	EP2102955-003	EP2102955-004	EP2102955-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.02**	<0.01	**48.2**	**0.55**	**0.03**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.9**	<0.1	**1.3**	**0.9**	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**2.56**	<0.02	**2.05**	**2.88**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**3.14**	<0.02	**12.6**	**2.07**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.62**	<0.02	**2.17**	**0.33**	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.30**	<0.01	**7.28**	**0.30**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	**0.04**	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW217_210318	0089_MW224_210318	0089_MW282_210318	0089_MW216_210318	0089_MW243_210318
				Sampling date / time	18-Mar-2021 09:28	18-Mar-2021 09:29	18-Mar-2021 09:35	18-Mar-2021 09:37	18-Mar-2021 12:33
Compound	CAS Number	LOR	Unit		EP2102955-001	EP2102955-002	EP2102955-003	EP2102955-004	EP2102955-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**28.5**	<0.05	<0.05	**2.17**	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		**0.34**	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**36.4**	<0.01	**132**	**13.8**	**0.03**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.02**	<0.01	**94.0**	**4.30**	**0.03**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**36.4**	<0.01	**122**	**13.3**	**0.03**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**91.1**	**95.1**	**95.1**	**99.2**	**91.9**
13C8-PFOA	----	0.02	%		**90.8**	**93.7**	**97.4**	**91.4**	**93.9**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW238_210318	0089_MW245_210318	----	----	----
			Sampling date / time	18-Mar-2021 12:39	18-Mar-2021 12:48	----	----	----
Compound	CAS Number	LOR	Unit	EP2102955-006	EP2102955-007	--------	--------	--------
				Result	Result	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.07	7.71	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	396	512	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	42	24	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	189	494	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	189	494	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	82	2	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	34	20	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	91	142	----	----	----
Magnesium	7439-95-4	1	mg/L	18	15	----	----	----
Sodium	7440-23-5	1	mg/L	28	25	----	----	----
Potassium	7440-09-7	1	mg/L	5	6	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	6.44	10.5	----	----	----
ø Total Cations	----	0.01	meq/L	7.37	9.56	----	----	----
ø Ionic Balance	----	0.01	%	6.70	4.56	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	4	34	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW238_210318	0089_MW245_210318	----	----	----
				Sampling date / time	18-Mar-2021 12:39	18-Mar-2021 12:48	----	----	----
Compound	CAS Number	LOR	Unit		EP2102955-006	EP2102955-007	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.08**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW238_210318	0089_MW245_210318	----	----	----
				Sampling date / time	18-Mar-2021 12:39	18-Mar-2021 12:48	----	----	----
Compound	CAS Number	LOR	Unit		EP2102955-006	EP2102955-007	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.08**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.08**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.08**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.8**	**103**	----	----	----
13C8-PFOA	----	0.02	%		**96.2**	**99.4**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102955**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 22-Mar-2021
C-O-C number	: 20430	Issue Date	: 31-Mar-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3588434)									
EP2102941-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.03	8.01	0.249	0% - 20%
EP2102954-007	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.98	7.97	0.125	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3588436)									
EP2103128-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.93	7.89	0.506	0% - 20%
EP2103069-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.98	7.96	0.251	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3582322)									
EP2102954-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	283	292	2.96	0% - 20%
EP2102954-009	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1510	1500	0.996	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3582354)									
EP2102955-005	0089_MW243_210318	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	550	543	1.37	0% - 20%
EP2103023-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	574	562	1.94	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3582323)									
EP2102954-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	82	79	4.02	0% - 50%
EP2102954-011	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	241	231	4.13	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3582355)									
EP2102955-005	0089_MW243_210318	EA025H: Suspended Solids (SS)	----	5	mg/L	20	19	5.19	No Limit
EP2103023-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	18	16	11.9	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3588433)									
EP2102941-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	114	112	1.64	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	114	112	1.64	0% - 20%
EP2102954-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3588433) - continued									
EP2102954-007	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	438	371	16.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	438	371	16.4	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3588435)									
EP2103119-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	60	61	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	60	61	0.00	0% - 20%
EP2103069-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	233	232	0.482	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	233	232	0.482	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3581679)									
EP2102941-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2080	2130	2.43	0% - 20%
EP2102955-007	0089_MW245_210318	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3581680)									
EP2102941-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	12900	12800	0.837	0% - 20%
EP2102955-007	0089_MW245_210318	ED045G: Chloride	16887-00-6	1	mg/L	20	20	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3577794)									
EP2102941-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	294	300	1.87	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	881	906	2.78	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	7010	7130	1.65	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	392	400	1.99	0% - 20%
EP2102954-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	89	85	4.53	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	38	38	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	96	98	2.02	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	15	15	0.00	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 3577795)									
EP2102955-005	0089_MW243_210318	ED093F: Calcium	7440-70-2	1	mg/L	122	127	4.45	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	18	19	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	38	40	3.22	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3586006)									
EP2102954-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	4	25.4	No Limit
EP2102954-011	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	6	8	23.9	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.03	0.03	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3588126) - continued									
ES2110646-001	Anonymous	EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES2110646-003	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.08	0.08	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.05	63.5	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.22	0.24	10.3	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.1	0.1	0.00	No Limit
ES2110646-003	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.11	0.10	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.29	0.29	0.00	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.1	0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3588126) - continued									
ES2110646-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2110646-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	2.14	2.03	5.45	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2110646-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	1.56	1.55	0.939	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.63	2.56	2.70	0% - 20%
ES2110646-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.15	2.13	0.934	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3588434)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3588436)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3582322)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114
				<10	1000 mg/L	100	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3582354)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.9	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3582323)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	113	89.1	120
				<5	1000 mg/L	98.0	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3582355)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	111	89.1	120
				<5	1000 mg/L	95.8	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3588433)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	93.3	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3588435)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	102	81.2	126
				<1	200 mg/L	93.1	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3581679)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	108	87.7	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 3581680)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.1	87.9	114
				<1	1000 mg/L	97.9	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3577794)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.0	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.4	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.2	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.1	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3577795)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.0	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.7	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.1	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3586006)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	108	87.2	116
				<1	100 mg/L	105	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3588126)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	97.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	109	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	105	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	117	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	90.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	120	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3588126)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	101	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	113	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	125	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	126	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	117	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3588126)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	113	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	85.3	62.6	147

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3588126) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	95.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	96.9	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	118	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	127	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3588126)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	105	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	109	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	126	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	111	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3581679)							
EP2102941-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3581680)							
EP2102941-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3586006)							
EP2102954-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	104	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3588126)							
ES2110646-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	100	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	104	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	118	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	126	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	101	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	126	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3588126)							
ES2110646-002	Anonymous						

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3588126) - continued							
ES2110646-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	104	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	103	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	121	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	129	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	129	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	128	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	118	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	121	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	129	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	125	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	118	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3588126)							
ES2110646-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	117	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	108	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	85.6	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	104	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	117	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	115	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	126	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3588126)							
ES2110646-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	88.8	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	89.9	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	119	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	90.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102955**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 31-Mar-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 7
Order number	: DEF19009/730	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2102941--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2102941--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW217_210318,	0089_MW224_210318,	----	----	----	26-Mar-2021	18-Mar-2021	**8**
0089_MW282_210318,	0089_MW216_210318,						
0089_MW243_210318,	0089_MW238_210318,						
0089_MW245_210318							

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_MW217_210318,	0089_MW224_210318,	**18-Mar-2021**	**----**	----	----	**26-Mar-2021**	18-Mar-2021	×
0089_MW282_210318,	0089_MW216_210318,							
0089_MW243_210318,	0089_MW238_210318,							
0089_MW245_210318								

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**----**	----	----	**24-Mar-2021**	25-Mar-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**----**	----	----	**24-Mar-2021**	25-Mar-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**----**	----	----	**26-Mar-2021**	01-Apr-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**----**	----	----	**29-Mar-2021**	15-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**----**	----	----	**29-Mar-2021**	15-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**----**	----	----	**22-Mar-2021**	25-Mar-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**----**	----	----	**25-Mar-2021**	15-Apr-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW217_210318, 0089_MW224_210318, 0089_MW282_210318, 0089_MW216_210318, 0089_MW243_210318, 0089_MW238_210318, 0089_MW245_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	26	**11.54**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102955**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20430	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 19-Mar-2021 16:00	Issue Date	: 22-Mar-2021
Client Requested Due Date	: 31-Mar-2021	Scheduled Reporting Date	: **31-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 28.8 - Ice present
Receipt Detail	: Ice Melted	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102955-001	18-Mar-2021 09:28	0089_MW217_210318	✓	✓	✓	✓	✓	✓	✓
EP2102955-002	18-Mar-2021 09:29	0089_MW224_210318	✓	✓	✓	✓	✓	✓	✓
EP2102955-003	18-Mar-2021 09:35	0089_MW282_210318	✓	✓	✓	✓	✓	✓	✓
EP2102955-004	18-Mar-2021 09:37	0089_MW216_210318	✓	✓	✓	✓	✓	✓	✓
EP2102955-005	18-Mar-2021 12:33	0089_MW243_210318	✓	✓	✓	✓	✓	✓	✓
EP2102955-006	18-Mar-2021 12:39	0089_MW238_210318	✓	✓	✓	✓	✓	✓	✓
EP2102955-007	18-Mar-2021 12:48	0089_MW245_210318	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102955-001	18-Mar-2021 09:28	0089_MW217_210318	✓
EP2102955-002	18-Mar-2021 09:29	0089_MW224_210318	✓
EP2102955-003	18-Mar-2021 09:35	0089_MW282_210318	✓
EP2102955-004	18-Mar-2021 09:37	0089_MW216_210318	✓
EP2102955-005	18-Mar-2021 12:33	0089_MW243_210318	✓
EP2102955-006	18-Mar-2021 12:39	0089_MW238_210318	✓
EP2102955-007	18-Mar-2021 12:48	0089_MW245_210318	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
0089_MW216_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW217_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_MW224_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----

0089_MW238_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	✘	----	----
0089_MW243_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	✘	----	----
0089_MW245_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	✘	----	----
0089_MW282_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	✘	----	----

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV) — Email [redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

COC#: **20430** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 19/3 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW217		18/03/2021 09:28 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW224		18/03/2021 09:29 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW282		18/03/2021 09:35 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_MW216		18/03/2021 09:37 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_MW243		18/03/2021 12:33 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		
006	0089_MW238		18/03/2021 12:39 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_MW245		18/03/2021 12:48 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2102955

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: **20430** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW217	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW224	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW282	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW216	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW243	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **20430** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW238	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW245	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **20430** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW217	Clear Plastic Bottle - Natural	250 mL	00070719175387	Green	No	
001	0089_MW217	HDPE (no PTFE)	20 mL	00352010071203	Grey	No	
001	0089_MW217	HDPE (no PTFE)	20 mL	00352010071153	Grey	No	
001	0089_MW217	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001828	Purple	No	
002	0089_MW224	Clear Plastic Bottle - Natural	250 mL	00070719175518	Green	No	
002	0089_MW224	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049498	Purple	No	
002	0089_MW224	HDPE (no PTFE)	20 mL	00352010071408	Grey	No	
002	0089_MW224	HDPE (no PTFE)	20 mL	00352010071415	Grey	No	
003	0089_MW282	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049475	Purple	No	
003	0089_MW282	HDPE (no PTFE)	20 mL	00352010071637	Grey	No	
003	0089_MW282	HDPE (no PTFE)	20 mL	00352010071659	Grey	No	
003	0089_MW282	Clear Plastic Bottle - Natural	250 mL	00070719175507	Green	No	
004	0089_MW216	HDPE (no PTFE)	20 mL	00352010071582	Grey	No	
004	0089_MW216	HDPE (no PTFE)	20 mL	00352010071180	Grey	No	
004	0089_MW216	Clear Plastic Bottle - Natural	250 mL	00070719175500	Green	No	
004	0089_MW216	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049461	Purple	No	
005	0089_MW243	Clear Plastic Bottle - Natural	250 mL	00070719175464	Green	No	
005	0089_MW243	HDPE (no PTFE)	20 mL	00352010071666	Grey	No	
005	0089_MW243	HDPE (no PTFE)	20 mL	00352010071490	Grey	No	
005	0089_MW243	HDPE (no PTFE)	20 mL	00352010071657	Grey	No	
005	0089_MW243	HDPE (no PTFE)	20 mL	00352010071648	Grey	No	
005	0089_MW243	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001544	Purple	No	
006	0089_MW238	HDPE (no PTFE)	20 mL	00352010071676	Grey	No	
006	0089_MW238	HDPE (no PTFE)	20 mL	00352010071326	Grey	No	
006	0089_MW238	Clear Plastic Bottle - Natural	250 mL	00070719175527	Green	No	
006	0089_MW238	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049550	Purple	No	

CHAIN OF CUSTODY

COC#: **20430** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_MW245	Clear Plastic Bottle - Natural	250 mL	00070719175542	Green	No	
007	0089_MW245	HDPE (no PTFE)	20 mL	00352010071241	Grey	No	
007	0089_MW245	HDPE (no PTFE)	20 mL	00352010071156	Grey	No	
007	0089_MW245	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001823	Purple	No	

Total Bottle Count: ALS: 30, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2102956**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021 16:00
Order number	: DEF19009/730	Date Analysis Commenced	: 22-Mar-2021
C-O-C number	: 20436	Issue Date	: 31-Mar-2021 12:20
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW411_210318	----	----	----	----
				Sampling date / time	18-Mar-2021 10:34	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102956-002	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.74	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		43000	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		137	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		137	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		137	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2800	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		20300	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		457	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1430	----	----	----	----
Sodium	7440-23-5	1	mg/L		11000	----	----	----	----
Potassium	7440-09-7	1	mg/L		592	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		634	----	----	----	----
ø Total Cations	----	0.01	meq/L		634	----	----	----	----
ø Ionic Balance	----	0.01	%		0.03	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		5	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW411_210318	----	----	----	----
			Sampling date / time		18-Mar-2021 10:34	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102956-002	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW411_210318	----	----	----	----
				Sampling date / time	18-Mar-2021 10:34	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102956-002	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.5**	----	----	----	----
13C8-PFOA	----	0.02	%		**94.8**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW412_210318	----	----	----	----
				Sampling date / time	18-Mar-2021 10:30	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102956-001	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.81	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		41500	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		10	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		111	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		111	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2700	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		20100	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		443	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1430	----	----	----	----
Sodium	7440-23-5	1	mg/L		11100	----	----	----	----
Potassium	7440-09-7	1	mg/L		589	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		625	----	----	----	----
ø Total Cations	----	0.01	meq/L		638	----	----	----	----
ø Ionic Balance	----	0.01	%		0.97	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		2	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW412_210318	----	----	----	----
				Sampling date / time	18-Mar-2021 10:30	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102956-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW412_210318	----	----	----	----
				Sampling date / time	18-Mar-2021 10:30	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2102956-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**101**	----	----	----	----
13C8-PFOA	----	0.02	%		**90.4**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2102956**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 22-Mar-2021
C-O-C number	: 20436	Issue Date	: 31-Mar-2021
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 2		
No. of samples analysed	: 2		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3588436)									
EP2103128-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.93	7.89	0.506	0% - 20%
EP2103069-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.98	7.96	0.251	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3582354)									
EP2102955-005	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	550	543	1.37	0% - 20%
EP2103023-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	574	562	1.94	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3582355)									
EP2102955-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	20	19	5.19	No Limit
EP2103023-005	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	18	16	11.9	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3588435)									
EP2103119-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	60	61	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	60	61	0.00	0% - 20%
EP2103069-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	233	232	0.482	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	233	232	0.482	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3578930)									
EP2102954-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	28	27	0.00	0% - 20%
EP2102954-011	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	51	52	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3578931)									
EP2102954-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	25	25	0.00	0% - 20%
EP2102954-011	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	78	80	2.38	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3577795)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3577795) - continued									
EP2102955-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	122	127	4.45	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	18	19	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	38	40	3.22	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3586006)									
EP2102954-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	4	25.4	No Limit
EP2102954-011	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	6	8	23.9	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3588714)									
EP2102956-002	0089_PW411_210318	EP005: Total Organic Carbon	----	1	mg/L	5	4	0.00	No Limit
EP2103166-010	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	24	24	0.00	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES2110646-003	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.08	0.08	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.05	63.5	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.22	0.24	10.3	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.1	0.1	0.00	No Limit
ES2110646-003	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.11	0.10	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.29	0.29	0.00	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.02	0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3588126) - continued									
ES2110646-003	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.1	0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2110646-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	2.14	2.03	5.45	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3588126) - continued									
ES2110646-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2110646-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	1.56	1.55	0.939	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3588126)									
ES2110646-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.63	2.56	2.70	0% - 20%
ES2110646-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.15	2.13	0.934	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3588436)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3582354)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.9	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3582355)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	111	89.1	120
				<5	1000 mg/L	95.8	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3588435)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	102	81.2	126
				<1	200 mg/L	93.1	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3578930)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.4	87.7	113
				<1	500 mg/L	102	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3578931)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3577795)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.0	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.7	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.1	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3586006)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	108	87.2	116
				<1	100 mg/L	105	87.2	116
EP005: Total Organic Carbon (TOC) (QCLot: 3588714)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	107	87.2	116
				<1	100 mg/L	105	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3588126)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	97.8	72.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3588126) - continued								
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	109	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	105	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	117	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	90.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	120	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3588126)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	101	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	113	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	125	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	126	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	117	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3588126)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	113	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	85.3	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	95.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	96.9	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	118	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	127	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3588126)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	105	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	109	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	126	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	111	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3578930)							
EP2102954-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	99.3	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3578931)							
EP2102954-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	99.4	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3586006)							
EP2102954-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	104	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3588714)							
EP2103166-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	106	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3588126)							
ES2110646-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	100	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	104	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	118	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	126	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	101	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	126	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3588126)							
ES2110646-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	104	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	103	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	121	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	129	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	129	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	128	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	118	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	121	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	129	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	125	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	118	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3588126)							
ES2110646-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	117	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	108	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	85.6	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	104	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	117	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	115	65.0	136

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3588126) - continued							
ES2110646-002	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	126	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3588126)							
ES2110646-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	88.8	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	89.9	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	119	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	90.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2102956**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 19-Mar-2021
Site	: DEF19009/Stirling	Issue Date	: 31-Mar-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 2
Order number	: DEF19009/730	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_SW412_210318, 0089_PW411_210318	----	----	----	26-Mar-2021	18-Mar-2021	**8**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**----**	----	----	**26-Mar-2021**	18-Mar-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**----**	----	----	**24-Mar-2021**	25-Mar-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**----**	----	----	**24-Mar-2021**	25-Mar-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**----**	----	----	**26-Mar-2021**	01-Apr-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**----**	----	----	**25-Mar-2021**	15-Apr-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**----**	----	----	**25-Mar-2021**	15-Apr-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**----**	----	----	**22-Mar-2021**	25-Mar-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW412_210318	**18-Mar-2021**	**----**	----	----	**25-Mar-2021**	15-Apr-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW411_210318	**18-Mar-2021**	**----**	----	----	**26-Mar-2021**	15-Apr-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW412_210318, 0089_PW411_210318	**18-Mar-2021**	**30-Mar-2021**	14-Sep-2021	✓	**30-Mar-2021**	14-Sep-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2102956**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 20436	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 19-Mar-2021 16:00	Issue Date	: 22-Mar-2021
Client Requested Due Date	: 31-Mar-2021	Scheduled Reporting Date	: **31-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 28.8 - Ice present
Receipt Detail	: Ice Melted	No. of samples received / analysed	: 2 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2102956-001	18-Mar-2021 10:30	0089_SW412_210318	✓	✓	✓	✓	✓	✓	✓
EP2102956-002	18-Mar-2021 10:34	0089_PW411_210318	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2102956-001	18-Mar-2021 10:30	0089_SW412_210318	✓
EP2102956-002	18-Mar-2021 10:34	0089_PW411_210318	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
0089_PW411_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----
0089_SW412_21031	Clear Plastic Bottle - Natural	----	18-Mar-2021	19-Mar-2021	×	----	----

Requested Deliverables

ACCOUNTS PAYABLE (WA)

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

CHAIN OF CUSTODY

(ALS) COC#: **20436** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	[redacted] BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 19/3 1600	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW412		18/03/2021 10:30 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW411		18/03/2021 10:34 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2102956

Telephone : -- 61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: **20436** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW412	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW411	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **20436** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW412	Clear Plastic Bottle - Natural	250 mL	00070719175392	Green	No	
001	0089_SW412	Amber TOC Vial - Sulfuric Acid	40 mL	00180220001880	Purple	No	
001	0089_SW412	HDPE (no PTFE)	20 mL	00352010071349	Grey	No	
001	0089_SW412	HDPE (no PTFE)	20 mL	00352010071270	Grey	No	
002	0089_PW411	Amber TOC Vial - Sulfuric Acid	40 mL	00180220049523	Purple	No	
002	0089_PW411	Clear Plastic Bottle - Natural	250 mL	00070719175589	Green	No	
002	0089_PW411	HDPE (no PTFE)	20 mL	00352010071218	Grey	No	
002	0089_PW411	HDPE (no PTFE)	20 mL	00352010071457	Grey	No	

Total Bottle Count: ALS: 8, Non ALS: 0

APPENDIX

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FIELD RECORDS & CALIBRATION CERTIFICATES

Monitoring Date	Monitoring Location	Sample ID	Bore Depth (m)	TOC (mAHD)	SWL (bTOC)	RWL (mAHD)	Gauging Time	Other Observations on Bore/Site	Sampling Method	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Sample #	Odour	Colour
18/03/2021	MW010	0089_MW010_210318	5.75	4.859	4.56	0.299	09:54		HydraSleeve	22.1	2.39	2854	1852.5	7.35	-137		Fuel smell	Clear
16/03/2021	MW109	0089_MW109_210316	5.44	4.446	4.022	0.424	10:03		HydraSleeve	22.4	0.32	1173	115050	7.44	-223.7			Clear
16/03/2021	MW112	0089_MW112_210316	5.73	3.973	3.435	0.538	09:49	QC112, QC212	HydraSleeve	23.2	1.65	534	344.5	7.63	116.7	112, 212		Clear,Green
16/03/2021	MW117	0089_MW117_210316	4.98	3.762	3.28	0.482	09:01	QC109, QC209	HydraSleeve	23.2	1.41	1072	695.5	7.19	110.3	109, 209		Clear,Green
16/03/2021	MW120	0089_MW120_210316	5.92	4.409	3.42	0.989	10:13	Cloudy	HydraSleeve	23.2	2.06	635	409.5	7.64	82.2			Cloudy
16/03/2021	MW121	0089_MW121_210316	4.2	3.7			09:41		HydraSleeve	24.2	3.89	661	429	7.69	61.8			Cloudy
16/03/2021	MW123	0089_MW123_210316	6.8	6.62	6.22	0.4	08:59	Hand bailed QC108/208	HydraSleeve	26	1.41	695	455	7.3	33.3	108/208		Cloudy
15/03/2021	MW124	0089_MW124_210315	4.3	1.899	1.635	0.264	09:35		HydraSleeve	20.8	0.83	38532	27209	7.99	-262.9			Clear
15/03/2021	MW125	0089_MW125_210315	4.3	1.882	1.73	0.152	10:40		HydraSleeve	21.1	0.81	44213	31070	7.4	-199.4			Clear
15/03/2021	MW126	0089_MW126_210315	3.325	1.948	1.825	0.123	10:05	bore missing cap. needs replacing	HydraSleeve	20.3	1.24	40561	28957.5	7.24	-254.2		Seawater	Clear
15/03/2021	MW127	0089_MW127_210315	4.3	1.771	1.63	0.141	09:44		HydraSleeve	20.8	0.66	38542	27235	7.32	-264.4		Seawater	Clear
16/03/2021	MW128						10:27	DRY										
16/03/2021	MW137	0089_MW137_210316		2.058	1.78	0.278	11:08		HydraSleeve	23.7	0.97	53784	34970	7.39	7.8			Cloudy
16/03/2021	MW139	0089_MW139_210316		2.273	2	0.273	09:08		HydraSleeve	23.2	11.4	4339	2814.5	7.47	64.7			Clear
16/03/2021	MW141	0089_MW141_210316		3.025	2.76	0.265	11:42		HydraSleeve	21.8	0.69	33145	21554	7.18	-246.1		sulphur	Cloudy
16/03/2021	MW142	0089_MW142_210316		2.573	2.32	0.253	10:58		HydraSleeve	23.9	0.84	41270	26819	7.28	-76.2			Yellow
16/03/2021	MW147			3.423		3.423	11:42	Dry										
16/03/2021	MW149	0089_MW149_210316		2.303	2.06	0.243	09:53		HydraSleeve	20.8	9.5	53451	34742	7.39	73.1			Clear
15/03/2021	MW158	0089_MW158_210315	14.85	14.541	-		11:26	Dipper wasn't Working	HydraSleeve	22.4	1.49	16445	10692	7.3	45.6			Clear
15/03/2021	MW161	0089_MW161_210315	18.29	17.225	16.7	0.525	11:28		HydraSleeve	22.3	1.94	3843	2632.5	7.45	56.4			Clear,Cloudy
15/03/2021	MW166	0089_MW166_210315	12.53	11.89	11.295	0.595	12:47	Mislabelled in COC as 127	HydraSleeve	26	1.74	5043	3282	7.41	28.8			
15/03/2021	MW171	0089_MW171_210315	34.945	29.238	28.55	0.688	11:53		HydraSleeve	25.9	1.26	8569	5570.5	7.32	-226.5		Sulphur smell	Cloudy
15/03/2021	MW172						12:46	Dry										
16/03/2021	MW173	0089_MW173_210316	11.47	10.08	9.595	0.485	11:59	Bailer used due to shallow water	HandBailing	24.6	1.5	3586	2333.5	7.53	-1900	114, 214	Mild organic	Clear
16/03/2021	MW193	0089_MW193_210316	12.1	11.86	11.8	0.06	11:56	Hand bailed	HandBailing	26.8	1.14	3820	2548	7.23	-119			Clear
16/03/2021	MW195D	0089_MW195D_210316	17.76	4.363	4.17	0.193	12:33	QC115, QC215	HydraSleeve	23.5	0.72	30467	19812	7.5	-135	115, 215		Clear
16/03/2021	MW195S	0089_MW195S_210316	7.93	4.571	3.8	0.771	12:28		HydraSleeve	25.9	2.85	5102	3315	7.28	-38.5			Clear
16/03/2021	MW196		12.82	12.75		12.75	13:33	DRY										
16/03/2021	MW197	0089_MW197_210316	2.67	2.28	2.015	0.265	11:17		HandBailing	23.5	2.95	7341	4771	7.61	4.5			Clear
16/03/2021	MW199	0089_MW199_210316		11.8	11.38	0.42	12:05	blocked less than 1 metre	HydraSleeve									
16/03/2021	MW200	0089_MW200_210316	2.69	2.07	1.82	0.25	10:55		HydraSleeve	26.2	2.16	11389	7403.5	7.41	23.5			Clear
15/03/2021	MW202	0089_MW202_210315		2.12	1.82	0.3	10:13		HydraSleeve	21.4	8.8	1487	962	7.7	86.8			Clear
16/03/2021	MW203	0089_MW203_210316		10.855	10.52	0.335	13:14		HydraSleeve	23.8	1.97	1013	656.5	7.89	21			Clear
18/03/2021	MW214						09:48	Dry										
18/03/2021	MW215						09:50	Dry										
18/03/2021	MW216	0089_MW216_210318		8.329	8.93	-0.601	09:38		HydraSleeve	21	2.26	1753	1137.5	7.52	118.1			Clear
18/03/2021	MW217	0089_MW217_210318		8.847	8.43	0.417	08:40		HydraSleeve	22.5	4.33	958	624	7.58	61.4			Clear
18/03/2021	MW220						08:46	Dry										
18/03/2021	MW224	0089_MW224_210318		13.372	12.95	0.422	08:55		HydraSleeve	21.1	4.49	894	578.5	7.84	65.1			Clear
17/03/2021	MW225						12:32	Dry										
17/03/2021	MW226	0089_MW226_210317	3.22	1.749	1.415	0.334	13:00		HydraSleeve	23.2	1	44123	28678	7.09	-121.6			Clear,Yellow
15/03/2021	MW227	0089_MW227_210315	4.1	2.961	2.8	0.161	13:40		HydraSleeve	21.6	0.61	5808	4030	7.92	-161.2			Clear,Cloudy
15/03/2021	MW228	0089_MW228_210315	4.06	2.23	2.08	0.15	13:16		HydraSleeve	23.3	0.57	28133	18291	7.27	-11952			Cloudy
15/03/2021	MW233	0089_MW233_210315		3.705	3.18	0.525	12:06		HydraSleeve	18.9	20.4	695	455	8.51	-167.4	QC104, QC204		Clear
16/03/2021	MW236	0089_MW236_210316	4.97	4.642	4.08	0.562	13:45	hand bailed due to shallow water	HandBailing	24.2	2.59	776	507	7.5	97.6			Clear
18/03/2021	MW238	0089_MW238_210318		4.827	4.45	0.377	12:41		HydraSleeve	21.3	1.31	728	474.5	7.74	2.8			Clear
18/03/2021	MW239	0089_MW239_210318	6.37	4.03	3.63	0.4	12:45		HydraSleeve	22.8	1.44	709	461.5	7.83	96			Clear
18/03/2021	MW240	0089_MW240_210318	5.8	4.483	4.7	-0.217	12:33		HydraSleeve	23.7	2.49	964	624	7.75	86.9			
18/03/2021	MW242	0089_MW242_210318	4.73	3.539	3.43	0.109	08:29		HydraSleeve	23.6	2.43	36676	442	7.42	39			Clear
18/03/2021	MW243	0089_MW243_210318	7.3	4.892	4.5	0.392	12:32		HydraSleeve	21.7	2.29	1931	1254.5	7.73	-5.1			Clear
18/03/2021	MW245	0089_MW245_210318		4.551	4.17	0.381	12:47		HydraSleeve	21.9	2.11	879	572	7.11	-129.4		HC	Black
18/03/2021	MW248	0089_MW248_210318	4.75	4.073	3.78	0.293	08:44	Shallow water, bailer used	HandBailing	22.5	1.61	1737	1131	7.3	-13.6			Clear
15/03/2021	MW249	0089_MW249_210315		5.227	4.93	0.297	12:21		HydraSleeve	22.6	6.2	1305	845	7.5	-197.2			Black
17/03/2021	MW255	0089_MW255_210317	6.36	4.609	4.1	0.509	13:35		HydraSleeve	24.3	0.96	1847	1202	7.64	-80			
17/03/2021	MW256	0089_MW256_210317	5.565	3.84	3.345	0.495	13:31		HydraSleeve	21.9	1.24	1955	1267.5	7.33	-116.6			Clear
18/03/2021	MW257	0089_MW257_210318	5.26	3.806	3.82	-0.014	09:11		HydraSleeve	22.2	5.14	579	377	7.78	74.9			Clear
18/03/2021	MW258		3.59			0	09:20	Dry. Potentially blocked by tree roots										
18/03/2021	MW259	0089_MW259_210318	5	3.8	3.32	0.48	09:24		HydraSleeve	21.3	2.66	36564	364	7.42	76.4			Clear
18/03/2021	MW261	0089_MW261_210318	4.76	3.858	3.36	0.498	10:06	Fuel smell	HydraSleeve	21.5	0.69	2965	1924	7.26	-143.3		Fuel smell	Clear
18/03/2021	MW264	0089_MW264_210318	6.66	4.806	4.38	0.426	09:36		HydraSleeve	21.9	1.31	36728	728	7.42	87.2			Clear
16/03/2021	MW268	0089_MW268_210316		4.056	3.75	0.306	13:35		HydraSleeve	22.4	0.76	9295	6038.5	7.35	58	QC116, QC 216		Clear
16/03/2021	MW269	0089_MW269_210316		4.153	3.84	0.313	13:48		HydraSleeve	22.7	0.84	2366	1540.5	7.69	-230.5		sulphur	Clear
16/03/2021	MW272	0089_MW272_210316		2.226	1.91	0.316	10:22		HydraSleeve	23.1	1.88	58883	38285	7.45	93.6			Clear
18/03/2021	MW282	0089_MW282_210318			8.35		09:07		HydraSleeve	23	0.97	1520	988	7.11	12.9			Clear
17/03/2021	MW288	0089_MW288_210317	3.89	4.003	3.585	0.418	12:23	shallow water. bailer used	HandBailing	24.4	2.7	1415	923	7.65	-177.5			Clear
16/03/2021	MW289	0089_MW289_210316		4.495	4.1	0.395	12:51		HydraSleeve	24.1	1.3	1322	871	7.82	27.3			
18/03/2021	MW516	0089_MW516_210318	7	6.37	6.29	0.08	08:46		HydraSleeve	22.5	0.77	1504	975	7.14	-136.2			Clear
18/03/2021	MW517	0089_MW517_210318	5.6	4.77	4.285	0.485	09:00		HydraSleeve	22.7	2.81	752	487.5	7.51	63			Clear
18/03/2021	MW518	0089_MW518_210318	6.98	5.55	5.175	0.375	09:45		HydraSleeve	21.1		36231	1501.5	7.47	89.3			Clear

Monitoring Date	Monitoring Location	Sample ID	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Sample #	Odour	Colour
15/03/2021	PW304	0089_PW304_210315	20.8	1.17	48004	31206.5	7.32	2.9			
17/03/2021	PW306	0089_PW306_210317	24.5	1.16	58544	8025	7.6	33.8			Clear
17/03/2021	PW307	0089_PW307_210317	23.8	3.87	58544	38025	8	65.9			Clear
17/03/2021	PW308	0089_PW308_210317	25.2	3.2	57750	37570	7.92	63.7			Clear
17/03/2021	PW314	0089_PW314_210317	24.3	3.11	60103	39065	7.66	59.9			Clear
17/03/2021	PW315	0089_PW315_210317	25.1	3.54	57309	37245	7.89	66.9			Clear
17/03/2021	PW316	0089_PW316_210317	26.6	3.33	60123	39065	7.96	63			Clear
16/03/2021	PW329	0089_PW329_210316	23.1	2.36	57859	37635	7.57	121	QC110, QC210		
16/03/2021	PW330	0089_PW330_210316	24	0.81	57538	37375	7.67	-50.5			Clear
16/03/2021	PW331	0089_PW331_210316	24.9	16	58310	37895	7.59	-99.8			Clear
15/03/2021	PW335	0089_PW335_210315	20.3	2.09	53257	8025	7.48	-188.4		Salty	Clear
15/03/2021	PW340	0089_PW340_210315	21.1	1.59	62031	40300	7.51	78.4			
15/03/2021	PW341	0089_PW341_210315	21.7	1.35	53674	37310	7.55	-26.4		Seawater smell	Clear,Cloudy
16/03/2021	PW345	0089_PW345_210316	25.7	1.31	53528	34840	7.08	-13.8			Clear
17/03/2021	PW346	0089_PW346_210317	30.5	0.37	46731	30355	6.96	19.5			Cloudy
17/03/2021	PW350	0089_PW350_210317	23.8	3.87	58595	36090	7.53	98.8			Clear
17/03/2021	PW351	0089_PW351_210317	23.4	3.19	56494	36725	7.7	111.2			Clear
17/03/2021	PW352	0089_PW352_210317	24	4.34	56595	36790	7.91	73.1			Clear
16/03/2021	PW356	0089_PW356_210316	24.4	2.52	58190	37830	7.43	-29.2			Clear
16/03/2021	PW357	0089_PW357_210316	24.6	0.67	58069	37765	7.64	-117			Clear
16/03/2021	PW358	0089_PW358_210316	23.2	1.33	57869	37635	7.71	69.9	QC113, QC213		Clear
15/03/2021	PW362	0089_PW362_210315	23.9	0.72	57350	37245	7.51	-179.6			Clear
15/03/2021	PW363	0089_PW363_210315	21.4	1.37	52385	3659500	7.5	-97.9		Seawater	Clear
15/03/2021	PW364	0089_PW364_210315	21.6	38.3	58261	37960	7.49	132			Clear
15/03/2021	PW367	0089_PW367_210315	22.2	0.26	59018	38415	7.24	-263			Clear
15/03/2021	PW368	0089_PW368_210315	23.9	0.69	57703	37505	7.65	7.9	QC202, QC102		Clear
16/03/2021	PW369	0089_PW369_210316	23.6	0.77	57841	37570	7.38	-55			Clear
15/03/2021	PW374	0089_PW374_210315	25.3	3.51	58314	37895	7.97	28.9	QC106, QC206		Clear
15/03/2021	PW375	0089_PW375_210315	23.9	3.34	57606	37505	8	23.7			Clear
15/03/2021	PW378	0089_PW378_210315	23.5	2.54	57464	37310	7.93	31.7			Clear
17/03/2021	PW380	0089_PW380_210317	24.2	4.34	59060	38415	7.76	108.2			Clear
17/03/2021	PW381	0089_PW381_210317	24	3.59	56218	36530	7.85	104.5			Clear
17/03/2021	PW401	0089_PW401_210317	24	4.41	53025	34450	7.76	107.4			Clear
15/03/2021	PW405	0089_PW405_210315	26.7	1.93	61893	38870	7.52	83.3			Clear
15/03/2021	PW407	0089_PW407_210315	25.8	4.61	56611	36790	7.88	45.1			Clear
17/03/2021	PW409	0089_PW409_210317	30.7	3.34	59270	38545	7.57	67.5			Clear
18/03/2021	PW411	0089_PW411_210318	25.5	3.71	57559	37375	7.6	46.4			Clear
18/03/2021	PW413	0089_PW413_210318	24.1	3.31	59350	38610	7.67	69.8			Clear
18/03/2021	PW415	0089_PW415_210318	24.9	3.78	39900	35928	7.86	66.9			Clear

Monitoring Location	Date	Sample ID	Time	Sampling Method	Sample Depth (m)	WaterBody Depth (m)	Flow Rate	Comments	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Water Colour	Turbidity
SW134	15/03/2021	0089_SW134_210315	10:25	Direct into Bottle	0.1	1	Medium		21.4	3.97	51889	36205	7.93	20.1	Clear	Low
SW132	15/03/2021	0089_SW132_210315	10:51	Direct into Bottle	0.1	1	Medium		22.3	3.93	52769	36140	7.81	7.2	Clear/brown	Low
SW130	15/03/2021	0089_SW130_210315		Direct into Bottle	0.1				24	3.45	56478	36725	8.08	33.1	Clear	
SW406	15/03/2021	0089_SW406_210315	13:33	Direct into Bottle	0.1	0.9	Medium		25.2	10.48	56705	36855	8.26	34	Clear	Low
SW408	15/03/2021	0089_SW408_210315	13:49	Direct into Bottle	0.2	0.9	Medium		25.2	4.32	55957	36075	8.09	87.1		Low
SW305	15/03/2021	0089_SW305_210315		Direct into Bottle	0.1	0.2	Fast		21.4	4.11	56985	37050	7.88	36.5	clear	Low
SW371	15/03/2021	0089_SW371_210315	11:20	Direct into Bottle	0.1	0.2	Fast	QC103/203	22.4	57.2	57225	37180	7.95	43.6	clear	Low
SW319	15/03/2021	0089_SW319_210315	13:11	Direct into Bottle	0.1	0.2	Fast	qc107,QC207	24.2	4.17	57377	37310	8.3	30.9	clear	Low
SW318	15/03/2021	0089_SW318_210315		Direct into Bottle	0.1		Fast		24.1	3.44	57313	37310	8.31	34.9	clear	Low
SW317	15/03/2021	0089_SW317_210315	13:48	Direct into Bottle	0.1	0.2	Fast		23.7	5.08	57326	37310	8.31	35.3	clear	Low
SW370	16/03/2021	0089_SW370_210316	11:10	Direct into Bottle	0.1	0.9	Medium		25.2	3.67	54256	35395	7.79	46.3	Clear	Low
SW156	16/03/2021	0089_SW156_210316		Direct into Bottle	0.1	0.2	Fast	QC111/211	22.4	2.9	57392	37310	8.02	95	clear	Low
SW154	16/03/2021	0089_SW154_210316	10:14	Direct into Bottle	0.1	0.2	Fast		23	3.35	57373	37310	8.06	72.5	clear	Low
SW152	16/03/2021	0089_SW152_210316	10:49	Direct into Bottle	0.1	0.2	Fast		24.2	3.11	54842	35815	7.73	3.1	clear	
SW150	16/03/2021	0089_SW150_210316	11:05	Direct into Bottle	0.1	0.2	Fast		24.9	4.19	57163	37245	8.02	5.1	clear	Low
SW373	17/03/2021	0089_SW373_210317		Direct into Bottle	0.1				28.6	5.35	56199	36465	7.96	49.2	Clear	
SW372	17/03/2021	0089_SW372_210317	12:41	Direct into Bottle	0.15	0.5	Slow		29	3.4	56038	36400	8.09	19.2	Clear	Low
SW410	17/03/2021	0089_SW410_210317	13:11	Direct into Bottle	0.1	1	Slow		26.9	4.86	56457	36725	8.2	0.8	Clear	Low
SW309	17/03/2021	0089_SW309_210317	13:57	Direct into Bottle	0.1	0.2	Medium		25.2	4.04	57314		8.21	55.2	Clear	Low
SW353	17/03/2021	0089_SW353_210317		Direct into Bottle	0.1	0.2	Fast		25.9	4.36	55200		8.04	74.4	clear	Low
SW384	17/03/2021	0089_SW384_210317	10:38	Direct into Bottle	0.1	0.2	Fast		24.7	4.95	55855	36355	8.08	71.1	clear	Low
SW383	17/03/2021	0089_SW383_210317	10:39	Direct into Bottle	0.1	0.2	Fast		24.5	4.39	56098	36465	8.11	71.3	clear	Low
SW382	17/03/2021	0089_SW382_210317	10:40	Direct into Bottle	0.1	0.2	Fast		24.4	4.82	55591	36140	8.14	71	clear	Low
SW311	17/03/2021	0089_SW311_210317	12:53	Direct into Bottle	0.1	0.2	Fast		24.8	3.17	57531	37440	8.1	55.5	clear	Low
SW310	17/03/2021	0089_SW310_210317	13:21	Direct into Bottle	0.1	0.2	Fast		25.1	3.66	57553	37440	8.16	61.6	clear	Low
SW412	18/03/2021	0089_SW412_210318	10:28	Direct into Bottle	0.1	1	Medium		24	4.02	55929	36335	8.09	42.6	Clear	Low
SW416	18/03/2021	0089_SW416_210318	10:13	Direct into Bottle	0.1	0.2	Fast		26.2	3.08	57773	37570	8.06	67.8	clear	Low
SW414	18/03/2021	0089_SW414_210318	10:35	Direct into Bottle	0.1	0.2	Fast		25	3.6	57455	37375	8.11	57.8	clear	Low

Monitoring Location	Date	Sample ID	Depth of Sample (m)	Sampling Method	Sample Condition	Sample Description	Comments/QC
SD335	15/03/2021	0089_SD335_210315	0.4	Shovel/Trowel	Wet	sand	
SD364	15/03/2021	0089_SD364_210315	0.4	Shovel/Trowel	Wet	sand	
SD363	15/03/2021	0089_SD363_210315	0.3	Shovel/Trowel	Wet	Yellow, gret sand, med grained	
SD340	15/03/2021	0089_SD340_210315	0.3	Shovel/Trowel	Wet	sand	
SD341	15/03/2021	0089_SD341_210315	0.3	Shovel/Trowel	Wet	Grey/yellow fine to medium sand	
SD362	15/03/2021	0089_SD362_210315	0.5	Shovel/Trowel	Wet	sand	
SD405	15/03/2021	0089_SD405_210315	0.2	Shovel/Trowel	Wet	Sand yellow	
SD407	15/03/2021	0089_SD407_210315	0.2	Shovel/Trowel	Wet	Yellow sand	
SD304	15/03/2021	0089_SD304_210315	0.3	Shovel/Trowel	Wet	sand	
SD368	15/03/2021	0089_SD368_210315	0.3	Shovel/Trowel	Wet	sand	QC101, QC201
SD367	15/03/2021	0089_SD367_210315	0.3	Shovel/Trowel	Wet	sand	
SD374	15/03/2021	0089_SD374_210315	0.2	Shovel/Trowel	Wet	sand	QC105, QC205
SD375	15/03/2021	0089_SD375_210315	0.2	Shovel/Trowel	Wet	sand	
SD378	15/03/2021	0089_SD378_210315	0.2	Shovel/Trowel	Wet	sand	
SD345	16/03/2021	0089_SD345_210316	0.5	Shovel/Trowel	Wet	sand	
SD369	16/03/2021	0089_SD369_210316	0.3	Shovel/Trowel	Wet	sand	
SD358	16/03/2021	0089_SD358_210316	0.2	Shovel/Trowel	Wet	sand	
SD329	16/03/2021	0089_SD329_210316	0.3	Shovel/Trowel	Wet	sand	
SD357	16/03/2021	0089_SD357_210316	0.3	Shovel/Trowel	Wet	sand	
SD356	16/03/2021	0089_SD356_210316	0.5	Shovel/Trowel	Wet	sand	
SD350	17/03/2021	0089_SD350_210317	0.4	Shovel/Trowel	Wet	sand	
SD380	17/03/2021	0089_SD380_210317	0.5	Shovel/Trowel	Wet	sand	
SD381	17/03/2021	0089_SD381_210317	0.5	Shovel/Trowel	Wet	sand	
SD352	17/03/2021	0089_SD352_210317	0.5	Shovel/Trowel	Wet	sand	
SD346	17/03/2021	0089_SD346_210317	0.3	Shovel/Trowel	Wet	sand	sample labeled SD366 in CoC
SD409	17/03/2021	0089_SD409_210317	0.3	Shovel/Trowel	Wet	sand	
SD380	17/03/2021	0089_SD380_210317	0.3	Shovel/Trowel	Wet	sand	
SD351	17/03/2021	0089_SD351_210317	0.5	Shovel/Trowel	Wet	Sand	
SD308	17/03/2021	0089_SD308_210317	0.3	Shovel/Trowel	Wet	Sand	QC117, QC217
SD307	17/03/2021	0089_SD307_210317	0.2	Shovel/Trowel	Wet	Sand	
SD315	17/03/2021	0089_SD315_210317	0.2	Shovel/Trowel	Wet	Sand	
SD314	17/03/2021	0089_SD314_210317	0.3	Shovel/Trowel	Wet	Sand	
SD306	17/03/2021	0089_SD306_210317	0.2	Shovel/Trowel	Wet	Sand	
SD411	18/03/2021	0089_SD411_210318	0.6	Shovel/Trowel	Wet	Sand	
SD415	18/03/2021	0089_SD415_210318	0.2	Shovel/Trowel	Wet	Sand	
SD413	18/03/2021	0089_SD413_210318	0.2	Shovel/Trowel	Wet	Sand	

Stirling Mar 21 Bump Test Records

Date	Standard	Units	Acceptable Range	YSI Serial No.		
				20K	20D	20B
16/03/2021	EC 35	mS/cm	5%	34957	34466	35160
	pH4	pH units	3.9 - 4.1	4.08	4.1	4.09
	pH7	pH units	6.9 - 7.1	7.03	6.91	6.96
	DO 0%	PPM	0.1 ppm	0.08	0.04	0.04
	Ambient Air (100%)	PPM	0.5 ppm	9.9	10	9.8
17/03/2021	EC 35	mS/cm	5%	35062	34799	33270
	pH4	pH units	3.9 - 4.1	4.1	4.1	4.22
	pH7	pH units	6.9 - 7.1	7.09	7.01	6.91
	DO 0%	PPM	0.1 ppm	0.1	0.03	0
	Ambient Air (100%)	PPM	0.5 ppm	9.6	9.1	9.7
18/03/2021	EC 35	mS/cm	5%	34126	33595	33460
	pH4	pH units	3.9 - 4.1	4.1	4.1	4.23
	pH7	pH units	6.9 - 7.1	7.05	7.11	7.05
	DO 0%	PPM	0.1 ppm	0.07	0.09	0.02
	Ambient Air (100%)	PPM	0.5 ppm	9.7	9.4	9.6

Note: Bump Test readings outside the acceptable range are in red

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20D101039
Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	173.40 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 57.86
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV -3 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

Parameter	Standards	Reference	Calibration Point	Span	Units	Instrument Readings Before	After	Units
Temperature		Room Temp	24.6	0	°C	NA	24.6	°C
pH	pH 7.00	356684	7.01	-30.20	mV	7.04	7.01	pH
pH	pH 4.00	355385	4.00	143.20	mV	4.07	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.01	2757	2764	µs/cm
ORP (Reference check only)	Zobell A & B	20/0506	230	230	mV	237.4	232.5	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	0.8	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	6.58	uA	108.7	100.0	%

Calibrated by: [redacted]

Calibration Date: 28-Feb-21
Next Due: 27-Aug-21

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20K104050
Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	172.60 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 57.6
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV -3 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature		Room Temp	24.6	0	°C	NA	24.6	°C
pH	pH 7.00	356684	7.01	-12.60	mV	7.06	7.01	pH
pH	pH 4.00	355385	4.00	160.00	mV	4.07	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.07	2737	2764	µs/cm
ORP (Reference check only)	Zobell A & B	20/0506	230	230	mV	235	232.5	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	-0.8	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	5.71	uA	93.1	100.0	%

Calibrated by: [redacted]

Calibration Date: 28-Feb-21
Next Due: 27-Aug-21

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20B120527
Cable length: 30m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	175.00 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.7
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 0 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	22.3	-0.2	°C	NA	22.1	°C
pH	pH 7.00	356684	7.01	-16.50	mV	7.03	7.01	pH
pH	pH 4.00	355385	4.00	158.50	mV	3.95	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.14	2770	2764	µs/cm
ORP (Reference check only)	Zobell A & B	20/0506	235	235	mV	239	235.8	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	0.5	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	6.03	uA	98.6	100.0	%

Calibrated by: [redacted]

Calibration Date: 04-Mar-21
Next Due: 31-Aug-21

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 19L102399
Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	172.80 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 57.65
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV -3 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature		Room Temp	24.6	0	°C	NA	24.6	°C
pH	pH 7.00	356684	7.01	-28.80	mV	7.08	7.01	pH
pH	pH 4.00	355385	4.00	144.00	mV	4.09	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.06	2777	2764	µs/cm
ORP (Reference check only)	Zobell A & B	20/0506	230	230	mV	235.5	232.5	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	0.4	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	6.51	uA	99	100.0	%

Calibrated by: [redacted]

Calibration Date: 28-Feb-21
Next Due: 27-Aug-21

APPENDIX

E

DATA QUALITY REVIEW

Data Quality Review
PFAS Ongoing Monitoring Plan Quarterly Monitoring Factual Report

This appendix reviews the Quality Assurance (QA) and Quality Control (QC) documentation. Quality assurance encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation should also include an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples submitted such as field blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

QA/QC Aspects	Evidence & Evaluation
	QA Documentation
Project Quality Plan/Work Plan and Data Quality Objectives	The field investigation was carried out between the 15 March 2021 and 18 March 2021 and is in accordance with the proposed scope of work, as documented in the SAQP (ref DEF19009_ HMAS_Stirling_SAQP_Rev3) issued to the client and in general compliance with the Australian standards AS 4482.1- 2005 "*Guide to Sampling and Investigation of Potentially Contaminated Soil, Part 1: Non-volatile and Semi-volatile Compounds",* Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling* and NEPM "*National Environment Protection (Assessment of Site Contamination) Measure".* A quality control program was implemented during the Investigation and the quality assurance procedures used have been reiterated in the report (DEF19009_2021 Q1 OMP Factual Report_HMAS Stirling). In addition, a Health, Safety and Environment Work Method Statement (HSEWMS) was also prepared. The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.
	Data Representativeness
Use of Composites	No Composites were used during the investigation
Holding Times	Chain of custody and laboratory reports provide evidence of holding times. Holding times were generally compliant with required timeframes. with the exception of the following: **Groundwater/porewater/surface water:** • EP2102752, EP2102755, EP2102756, EP2102758, EP2102833, EP2102834, EP2102836, EP2102837, EP2102890, EP2102900, EP2102892, EP2102901, EP2102941, EP2102954, EP2102955, EP2102956: o pH – 3 to 8 days overdue The holding time exceedances for a pH are not considered to have adversely impacted the reliability of the results obtained, or the conclusions drawn from this assessment. **Sediment:** No holding time non-compliance was reported for the sediment samples.
Background samples	No background samples were collected as part of this investigation.
Verification of field procedures	The methodology conducted during this investigation is documented in the body of the report, and was in general conformance with the SAQP.

<table>
<tr><th>QA/QC Aspects</th><th>Evidence & Evaluation</th></tr>
<tr><td></td><td>Non-disposable equipment was decontaminated between sample locations.</td></tr>
<tr><td colspan="2">Data Precision & Accuracy</td></tr>
<tr><td>QC sample Frequency</td><td>
<table>
<tr><th>QC sample type</th><th>SAQP required frequency</th><th>Sample Collected</th></tr>
<tr><td>Blind duplicate</td><td>1 in 10 primary water samples (10%)
>1 in 20 primary sediment samples (>5%)</td><td>14 for 126 primary water samples (11.1%)
3 for 39 primary sediment samples (7 %)</td></tr>
<tr><td>Split duplicate</td><td>1 in 10 primary water samples (10%)
>1 in 20 primary sediment samples (>5%)</td><td>14 for 126 primary water samples (11.1%)
3 for 39 primary sediment samples (7%)</td></tr>
<tr><td>Rinsate</td><td>1 per day / equipment used</td><td>11 (3x equipment for 3 days and 2x equipment for 1 days) (100%)</td></tr>
<tr><td>Field Blank</td><td>1 per day / field team (esky)</td><td>11 (3x field teams for 3 days and 2x samplers for 1 day) (100%)</td></tr>
</table>
QC sample frequency was compliant with the SAQP for water and sediment duplicates, rinsates and field blanks.
</td></tr>
<tr><td>QC Testing – Blind Replicates (Primary Lab)</td><td>
▪ Relative Percentage Difference (RPD) Acceptance Criteria:
<table>
<tr><th>Magnitude of Results</th><th>Acceptable RPD range</th></tr>
<tr><td>< 10 x LOR</td><td>No limits</td></tr>
<tr><td>10 – 20 LOR</td><td>0% - 50%</td></tr>
<tr><td>> 20 x LOR</td><td>0% - 20%</td></tr>
</table>
Groundwater, Porewater & Surface water
▪ Number of primary samples analysed: 126
▪ Duplicate samples analysed: 14
Sediment
▪ Number of primary samples analysed: 39
▪ Duplicate samples analysed: 3
The level of RPD is generally minor and probably related to the low analyte concentrations of analyte pairs.
</td></tr>
<tr><td>QC Testing – Field Splits (Secondary Lab)</td><td>
▪ Relative Percentage Difference (RPD) Acceptance Criteria:
<table>
<tr><th>Magnitude of Results</th><th>Acceptable RPD range</th></tr>
<tr><td>< 10 x LOR</td><td>No limits</td></tr>
<tr><td>10 – 20 LOR</td><td>0% - 50%</td></tr>
<tr><td>> 20 x LOR</td><td>0% - 20%</td></tr>
</table>
Groundwater, Porewater & Surface water
▪ Number of Samples Analysed: 140 (including QC)
▪ Field Split Samples Analysed: 14
Sediment
▪ Number of Samples Analysed: 42 (including QC)
▪ Field Split Samples Analysed: 3
The level of RPD is generally minor and probably related to the low analyte concentrations of analyte pairs and/or difference of methodologies between the primary and secondary laboratories.
</td></tr>
<tr><td>Field Blanks</td><td>Field Blanks were collected at a rate of one per field team (esky) per fieldwork day. All field blank samples tested reported analytes below the laboratory limit of reporting.</td></tr>
</table>

QA/QC Aspects	Evidence & Evaluation
Laboratory Internal QC	Evidence of the laboratories internal QC testing is present and complete in the reports. ALS (Primary) performed internal QC with adequate testing and satisfactory results for method blank, laboratory control samples and laboratory duplicates. All Matrix Spikes generally reported recoveries within the acceptance range of 70% to 130% with the exception of the following: ▪ EP2102833 - Water sample PFOS matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2102752, EP2102755, EP2102756, EP2102758, EP2102834, EP2102836, EP2102890, EP2102900, EP2102901, EP2102941, EP2102955 - Water sample sulfate and chloride matrix spike recoveries were not determined due to the background concentrations exceeding 4x spike level. All Laboratory Duplicate sample RPDs were within the acceptable criteria with exception of the following: ▪ EP2102888, EP2102902 - Soil sample exchangeable sodium percent duplicate RPD exceeded the LOR based limit. All Quality Control sample frequencies were of an acceptable rate with exception of the following: ▪ EP2102755, EP2102752, EP2102756, EP2102758, EP2102833, EP2102834, EP2102836, EP2102837, EP2102890, EP2102892, EP2102900, EP2102941, EP2102954 - Matrix Spikes and Lab duplicates for PFAS were undertaken less than the target rate. ▪ EP2102901 - Lab duplicates for PFAS were undertaken less than the target rate.
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were generally lower than the respective assessment criteria.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature. ALS Accreditation No. 825 Eurofins Accreditation No. 1261
Calibration of Field Equipment	All equipment used during the investigation was calibrated by the supplier prior to use. The equipment calibration certificates are provided in Appendix D. Cardno undertook in-field calibration checks (bump tests) for each YSI water quality meters per day of sampling. The bump tests found all parameters to be within the acceptable range with exception of DO (ambient air) for YSI 20D and pH 4 for YSI 20B on the 17/03/2021 and 18/03/2021. Cardno considers that the minor calibration drift is unlikely to affect the overall interpretation of the water quality parameters or the outcome of the sample analyses. As such, Cardno is satisfied that the equipment calibrations were acceptable for this assessment.
Decontamination and Equipment Blanks	Rinsate blanks were collected at a rate of one per day when reusable equipment is used (i.e. YSI, dipper, pore water sampler...). All rinsate samples tested reported analytes concentrations below the laboratory LORs.
Data Comparability	
Standard Procedures	Fieldwork procedures are detailed in the SAQP and reports and are comparable for each phase of Investigation.
Qualified Personnel	Staff involved in managing and reviewing the project and those involved in fieldwork are qualified personnel.
Sample Integrity	Field Chain of Custody/Laboratory request forms can be found in Appendix C.

QA/QC Aspects	Evidence & Evaluation
	Data Completeness
Completeness of test program	The scope of work undertaken was generally consistent with the SAQP.
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection process for groundwater and therefore, the data set used as the basis for groundwater investigation is considered valid and complete.

APPENDIX

F

INFORMATION ABOUT ENVIRONMENTAL REPORTS

About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- A factual report of the condition of a portion of the site or one aspect of an entire site.
- Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- Validation of the success of remediation of a site or a portion of a site.
- Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide "environmental sign-off" of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants' duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the "hot spot" method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as “residential – low density”, “commercial” etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

The ESA Report is prepared in a manner that can be easily read by a lay person with a legitimate interest in the contamination status of the site, such as the site owner or occupier, EPA and Local Planning Authority. The ESA report is not intended for use by other parties or for other purposes. Anyone who uses the assessment report for purposes other than specified in the report, does so at their own risk.

The site should only be used for one or more of the beneficial uses and land uses identified in the ESA as suitable.

The conditions and qualifications may apply to the suitability of the site for use, and it is the responsibility of the Client to be cognizant of and accept these in accepting the report. Cardno are only responsible for the issuing of the ESA report but accepts no liability for the costs incurred in the implementation of ESA findings.

The ESA provides a “snapshot” of the site conditions at the time of the site investigation. Consequently, the report may not be valid at a later time if there has been any change to the contamination status of the site in that time. Verification of the status of the site may be required in cases where a significant time has elapsed, or site conditions have changed since the assessment and audit.

The ESA is necessarily limited by constraints such as time, cost and available information; although normal professional practice at the time has been applied with all due care to prepare the report. A necessary requirement of this process is the horizontal and vertical interpolation of data from discrete locations. However, site conditions are generally not homogenous and some discrepancies will occur between the actual and predicted results at locations not directly sampled. There is a risk that contamination may occur at the site and not be identified by a competent investigation and assessment. The approach adopted in sampling (a combination of statistically based grid and judgmental sampling) seeks to reduce, but cannot eliminate, this risk.

Where unexpected occurrences of contamination arise, subsequent to the issue of the ESA Report, Cardno should be permitted to make an interpretation of these facts in relation to the ESA Report findings. Consequently, the Client should inform Cardno and seek their opinion. Cardno accepts no liability for costs incurred due to such

unexpected occurrences, given the inherent uncertainties in the assessment process.

Cardno uses information provided by other parties as the basis for the ESA, and reliance on this information is at the discretion of Cardno. However, however Cardno cannot guarantee any of the facts, findings or conclusions presented by other parties. Cardno will not be liable for the use of information, provided by others that is subsequently found to be intentionally misleading.

The ESA Report is not and does not purport to be anything other than a contaminated land ESA. It is not a geotechnical report and bore logs reproduced are for interpretation of the likely distribution of contamination. They are not intended for geotechnical interpretations and may not be adequate for this purpose.

The ESA Report is not intended to be a comprehensive analysis of the presence and associated risk of asbestos in buildings and services. Where asbestos in buildings and services is known or likely, the report may only caution that an appropriately qualified person be engaged to undertake demolition to avoid contamination of the site.

Cardno

13 August 2015

PFAS OMP Quarterly Sampling Event Factual Report

June 2021

HMAS Stirling

DEF19009

Prepared for
Department of Defence

5 August 2021

Cardno®

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

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Chemical Names

DOC	Dissolved Organic Carbon
DO	Dissolved Oxygen
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Per-fluoro-hexane Sulphonate
PFOA	Per-fluoro-octanoic Acid
PFOS	Per-fluoro-octane Sulfonate
TDS	Total Dissolved Solids (salinity of water)
TOC	Total Organic Carbon
TSS	Total Suspended Solids

Technical Terms

AFFF	Aqueous Film-Forming Foam
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
BGL	Below Ground Level
CEC	Cation Exchange Capacity
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
RWL	Reduced water levels
SAQP	Sampling and Analysis Quality Plan
SWL	Standing water level

Units

ha	Hectares
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

OMP	Ongoing Monitoring Plan
FTG	Fire Training Ground
HSF	Helicopter Support Facility

1 Introduction

1.1 Background

Cardno was engaged by the Australian Department of Defence ("the Client") to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) at HMAS Stirling ("the site"). The site is located on Garden Island, Western Australia and is displayed in Figure 1 of Appendix A.

The OMP was carried out in accordance with the scope and limitations presented in Cardno's Sampling and Analysis Quality Plan (SAQP):

> Cardno, 15 June 2021, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) HMAS Stirling'.

The SAQP was reviewed prior to the monitoring event and the following change was made:

> Gauging to be conducted during the same tidal period in discreet areas (snap gauging) for the purpose of interpreting groundwater contours and flow direction.

For the purposes of this report:

> The Management Area was defined as comprising of Garden Island and the marine nearshore environment (Figure 1B, Appendix A).

1.2 Purpose & Objectives

The objective of the OMP is to assess the changes in the nature and extent of PFAS within the environment, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor associated with Defence's historical use of legacy Aqueous Film Forming Foam (AFFF).

The purpose of this PFAS OMP factual report is to provide an up-to-date status of the condition of the site as it is currently understood in relation to the most recent sampling event.

The objectives of the report are:

> To provide a succinct summary of the Q2 2021 sampling event and provision of analytical results with supporting tables and figures.

> To provide confirmation of the current understanding of risk.

> To provide supporting data for the assessment of management actions, where relevant.

1.3 Relevant Guidelines

This assessment has been undertaken in general accordance with applicable industry standards for a site investigation for the purpose, objectives and scope identified in this report. These standards are set out in:

> National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013) (ASC NEPM).

> Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, PFAS National Environmental Management Plan (NEMP) 2.0.

> Australian Standard AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds.

> Standards Australia 1998. AS/NZ 5667:1998 Water quality – sampling.

> Australian and New Zealand Guidelines, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

- Department of Environment and Regulation (DER), 2014, Assessment and Management of Contaminated Sites[1].
- Department of Defence, Department of Energy, 2018, Quality System Manual Schedule B15.
- U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
- USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.
- National Health and Medical Research Council (NHMRC), August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.

2 Scope of Work

Cardno carried out the tasks detailed in the following sections in order to satisfy the purpose and objectives of this assessment.

2.1 Groundwater Monitoring

Sampling of selected groundwater bores was performed in accordance with the SAQP (Cardno, 2021), applying methods set out in section 3 of this report. The groundwater bores monitored as part of the OMP are presented in Table 2-1, and are shown on Figure 2, Appendix A.

Table 2-1 Groundwater Monitoring Locations

Monitoring Area	Location ID
Demolition Ground	MW137, MW139, MW141, MW142, MW147, MW149, MW272
Fire Training Area	MW109, MW112, MW117, MW120, MW121, MW123, MW124, MW125, MW126, MW127, MW128
Waste water treatment plant	MW158, MW161, MW166, MW171, MW172, MW173, MW193, MW195D, MW195S, MW196, MW197, MW199, MW200, MW202, MW203,
Accommodation Area	MW288, MW289
Dredge Spoil / Careening Bay	MW264, MW268, MW269
AVCAT Storage and Fuel Farm	MW233, MW236, MW238, MW239, MW240, MW242, MW243, MW245, MW516, MW248, MW249
Fire Station, Flammable / Hazardous Goods and Waste Storage, Ship Sullage	MW255, MW256, MW257, MW258, MW259, MW261, MW517, MW518, MW010
Helicopter Support Facility	MW214, MW215, MW216, MW217, MW220, MW224, MW225, MW226, MW227, MW228, MW282

2.2 Porewater, Surface Water and Sediment Monitoring

Porewater, sediment and surface water sampling were performed in accordance with the SAQP (Cardno, 2021), applying methods set out in Section 3 of this report. The porewater, surface water and sediment monitoring locations monitored as part of the OMP are presented in Table 2-2, and are shown on Figures 3 to 5, Appendix A.

[1] It is noted that Site is located on Commonwealth Land and is regulated under the Commonwealth environmental legislation, the State based DWER guidelines are relevant for the sampling of off-Site private properties and waterways.

Table 2-2 Porewater, Surface Water and Sediment Monitoring Locations

Monitoring Area	Porewater Sampling Location ID	Sediment Sampling Location ID	Surface Water Sampling Location ID
Demolition Ground	PW329, PW330, PW331, PW356, PW357, PW358	SD329, SD330, SD331, SD356, SD357, SD358	SW150, SW152, SW154, SW156
Fire Training Area	PW335, PW340, PW341, PW362, PW363, PW364	SD335, SD340, SD341, SD362, SD363, SD364	SW130, SW132, SW134
WWTP	PW304, PW345, PW367, PW368, PW369, PW350, PW351, PW352, PW380, PW381, PW401	SD304, SD345, SD367, SD368, SD369, SD350, SD351, SD352, SD380, SD381, SD401	SW305, SW370, SW371, SW372, SW373, SW353, SW382, SW383, SW384
Accommodation Area	PW346	SD346	
Dredge Spoil / Careening Bay	PW374, PW375, PW378	SD374, SD375, SD378	SW317, SW318, SW319
Helicopter Support Facility	PW306, PW307, PW308, PW314, PW315, PW316, PW405, PW407, PW409, PW411, PW413, PW415	SD306, SD307, SD308, SD314, SD315, SD316, SD405, SD407, SD409, SD411, SD413, SD415	SW309, SW310, SW311, SW406, SW408, SW410, SW412, SW414, SW416

2.3 Data Management

All the data included in the report has been collected, uploaded to the ESdat database and reviewed according to the data management requirements of the Defence Contamination Management Manual (DCMM Annex L).

The sample naming convention detailed in the DCMM Annex L was used in the field.

2.3.1 Defence ESdat database

Data collected as part of the Q2 2021 OMP monitoring event was uploaded to the ESdat database according to the data management requirements of the DCMM Annex L, including:

- All field data collected was uploaded;
- Laboratory data was uploaded and approved; and
- QA/QC data was reconciled.

2.4 Deviations from the OMP SAQP

Deviations from the SAQP for the Q2 2021 monitoring event are presented in Table 2-3 below.

Table 2-3 Deviations from OMP SAQP

Location	Deviation	Comments
MW128, MW147, MW172, MW214, MW215, MW225, MW258, MW288	Not sampled	These wells were found dry during this monitoring event.
MW199	Not Sampled	Monitoring well bent at 1.5 mbgl – unable to repair with a steel bailer.
MW220	Non-PFAS analytes not analysed	Not enough water to fill all the sampling bottles required for full analysis.
Surface water locations	Sampling depth	It was not always possible to position the sample container 10 cm below the surface water level due to the waves.

3 Methodology

3.1 Groundwater Sampling Methodology

Groundwater monitoring was generally undertaken by no purge HydraSleeve® method as detailed in Table 3-1.

Table 3-1 Groundwater Sampling Methodology

Activity	Details
Well Gauging	Standing Water Levels (SWL) were gauged using an interface probe. All wells were measured against a specified mark at the top of the well casing. Snap gauging was undertaken in each area presented on figure 6 to take in consideration tide influence. Time of gauging was recorded on field records sheets.
Groundwater Field Parameters	Groundwater field parameters were recorded via a down-hole water quality meter (positioned within the mid screen interval) prior to deployment of HydraSleeves® or pre-sample collection. The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Once field parameters have stabilised (as indicated by at least three consecutive measurements falling within +/- 10% of each other) measurement were recorded on field data records. All field instruments (e.g. water quality meter) were calibrated by the equipment supplier and bump tested daily to optimise the accuracy of the measurements taken. Calibration certificates and bump test records are provided in Appendix D.
Deployment of HydraSleeve	HydraSleeve were deployed with top weight for sample collection to begin at the lowest point. Following sampling, hydrasleeves were deployed in preparation for the next OMP monitoring event using the same string for consistency (same depth of sampling i.e. within screen depth).
Retrieval of HydraSleeves (Sample Collection)	HydraSleeve sampling devices were left in wells for a minimum of 12 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples were collected via continuous pull method at a rate allowing the water to pass through the check value into the sample sleeve. Samples were discharged immediately (minimise changes in chemistry) via discharge tube.
Hand bailing (alternative sampling method)	Disposable HDPE hand bailers, attached to a polypropylene string, were used at wells where the water column wasn't sufficient to fill the hydrasleeve. Purging of the well was undertaken prior to sampling to make sure that a sample representative of the aquifer is taken (i.e. removal of 3x well volume). A sample was collected once field parameters had stabilised.
Decontamination procedure	Dedicated HydraSleeves were used at each groundwater bore thus removing the need for decontamination. All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate). Where holding times did not comply, this is discussed in the data quality review in Appendix E.
Quality Control	Groundwater QC samples were collected at the following frequencies:

Activity	Details
	▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples sent to a secondary laboratory.
Laboratory Testing	Groundwater samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance). ▪ Total Organic carbon (TOC), total suspended solids (TSS), total dissolved solids (TDS) and pH. The primary laboratory was ALS Global Laboratories (Perth), and the secondary laboratory (quality control) was Eurofins (Perth). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.

3.2 Porewater and Sediment Sampling Methodology

The methodologies for sediment and porewater sampling are detailed in Table 3-2 and Table 3-3 respectively.

Table 3-2 Sediment Sampling Methodology

Item	Details
Sample Collection	Sediment samples were collected at the sediment/water interface using hand tools (e.g. trowel, hand auger, PVC pipe etc.) with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under CoC documentation.
Field Parameters	At each sampling location, the sediment sample was visually assessed and observations (including physical description) were recorded on field data sheets.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Quality Control	Sediment QC samples were collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples greater than 1 per 20 primary samples. ▪ Field triplicate (inter-laboratory) samples greater than 1 per 20 primary samples sent to a secondary laboratory.
Laboratory Testing	Sediment samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ TOC, EC, cation Exchange Capacity (CEC) and pH

Table 3-3 Porewater Sampling Methodology

Item	Detail
Porewater Sample Collection	Porewater sampling was undertaken in accordance with the USEPA guidance *Operating Procedure Pore Water Sampling*. Porewater was purged and sampled at less than 1 L per minute using a peristaltic pump, connected to a stainless steel tube with a screened section at its base (Drive-Point Piezometer). The porewater sampler was inserted to at least 1 m below the surficial marine sediments, to ensure collection of pore water rather than surface water. Tubing was replaced at each sampling location to prevent cross-contamination.
Field parameters	The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature.

Item	Detail
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation, transport and holding times.	As detailed in Table 3-1.
Quality Control	Porewater QC samples were collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples sent to a secondary laboratory.
Laboratory Testing	Porewater samples were submitted for the same analysis as groundwater samples (refer to Table 3-1).

3.3 Surface Water Sampling Methodology

The methodology for the surface water monitoring is detailed in Table 3-4.

Table 3-4 Surface water Sampling Methodology

Item	Details
Field parameters	The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Field observations such as odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Surface water samples were collected directly into sample containers using a 'Grab' (manual) sample method via a long-handled sampling device. The sample container was positioned 10 cm below the surface water level where possible and above the sediment bed and oriented with the capped opening facing downwards to avoid the collection of surface films. Samples were decanted into the laboratory supplied sample containers. Samples were collected in accordance with Australian/New Zealand Standards (AS/NZS 5667.1:1998) '*Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*'.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation, transport and holding times.	As detailed in Table 3-1.
Quality Control	Surface water QC samples were collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples sent to a secondary laboratory.
Laboratory Testing	Surface water samples were submitted for the same analysis as groundwater samples (refer to Table 3-1).

3.4 Quality Control / Quality Assurance

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following data quality indicators, as described in the SAQP:

> QA documentation.

- Bias.
- Data Representativeness.
- Data Precision & Accuracy.
- Laboratory Performance.
- Data Comparability.
- Data Set Completeness.

A detailed review of these aspects has been undertaken, the results of which are presented in Appendix E. The QA/QC review concluded that there are no significant systematic errors in the data collection process and therefore, the dataset used for the assessment is considered valid and complete.

3.5 Assessment Criteria

3.5.1 Groundwater, Porewater and Surface Water

The adopted assessment criteria for groundwater, porewater and surface water are detailed in Table 3-5.

Table 3-5 Criteria for Groundwater, Porewater and Surface Water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	µg/L		
Human Health - Drinking Water Quality Guideline	0.07[1]	0.56	HEPA 2020
Human Health – Recreational Water	2[1]	10	NHMRC 2019
Ecological – 99% species protection	0.00023[2]	19	HEPA 2020

Notes:

1. Sum of PFOS and PFHxS.
2. PFOS only; The criterion of 0.00023 µg/L is lower than the laboratory level of reporting (LOR), however, the PFAS NEMP 2020 allows for the adoption of the laboratory LOR as a screening level rather than a quantified measurement.

3.5.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment. Sediment will be assessed against the NEMP (HEPA, 2020) soil criteria for consistency with the SAQP (Cardno, 2021), DSI (RPS, 2018b) and ERA (RPS, 2018c). The adopted assessment criteria for sediments are detailed in Table 3-6.

Table 3-6 Criteria for Sediment

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	mg/kg		
Human Health - Commercial / industrial (on-base activities)	20[1]	50	HEPA 2020
Ecological - Open space – direct exposure (interim guidelines)	1[2]	10	HEPA 2020
Ecological - Industrial /Commercial – indirect exposure (interim guidelines) (on site)	0.01[2]	-	HEPA 2020

Notes:

1. Sum of PFOS and PFHxS.
2. PFOS only

4 Field Observations and Results

4.1 General Site Observations

No weather event or Site activities that could have impacted the sampling or results obtained were observed.

4.2 Groundwater

4.2.1 Summary of Field Observations

4.2.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the groundwater sampling event are presented in field sampling record sheets, included in Appendix D. Parameters were generally consistent with the previous monitoring event. Groundwater pH was near neutral, water was mostly clear and fresh to saline. Groundwater temperature ranged from 15.7°C (MW233) to 21.9°C (MW236). DO readings mostly indicate aerobic groundwater condition. EC readings ranged from 312.4 µS/cm (MW242) to 51,860 µS/cm (MW137) and indicate fresh to highly-saline groundwater conditions. There was some olfactory evidence of contamination recorded, with a sulphur or fuel smell noted at several groundwater wells.

4.2.1.2 Groundwater Elevation and Migration

Groundwater gauging data and reduced water levels (RWL) are provided within the field records in Appendix D. The groundwater elevations ranged between -1.462 mAHD (MW257) and 1.379 mAHD (MW518). It is expected that groundwater levels and migration are locally and temporally influenced by the tides.

Gauging data was used to infer the groundwater migration contours in discreet areas of the site. Groundwater flow was interpreted to be radial from the site (i.e. groundwater flows towards the ocean), which is consistent with previous monitoring events. Groundwater inferred elevation contours and flow direction for the Q2 2021 monitoring event are shown in Figure 6, Appendix A.

4.2.2 Groundwater Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-1. Laboratory results have also been compared to available historical data in order to identify monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 2 in Appendix A presents the groundwater monitoring locations. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-1 Summary of Groundwater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	MW109, MW112, MW117, MW141, MW173, MW220, MW236, MW256, MW282,	0.56[2]	4.50 (MW282)	60	9
Sum of PFHxS and PFOS	MW109, MW112, MW117, MW120, MW121, MW123, MW124, MW126, MW141, MW142, MW161, MW166, MW173, MW193, MW203, MW216, MW220, MW233, MW236, MW240, MW243, MW245, MW248, MW249, MW255, MW256, MW257, MW259, MW261, MW264, MW268, MW269, MW282, MW289, MW516	0.07[2]	83 (MW282)	60	35
PFOS	MW010, MW109, MW112, MW117, MW120, MW121, MW123, MW124, MW125, MW126, MW141, MW142, MW161, MW166, MW173, MW193, MW195D, MW195S, MW202, MW203, MW216, MW217, MW220, MW224, MW233, MW236, MW239, MW242, MW243, MW245, MW248, MW249, MW255, MW256, MW257	0.01[3]	47.3 (MW117)	60	41

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
	MW259, MW264, MW269, MW282, MW289, MW516				

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – drinking water
3. LOR adopted instead of HEPA (2020) guideline value for ecological – 99% species protection

Findings are summarised as follows:

- One groundwater sampling location (MW220) reported a first exceedance of the drinking water criteria (0.56 µg/L) for PFOA. This location had previously reported exceedances of the drinking water guideline for the sum of PFOS and PFHxS.
- No first time detections of PFOA or Sum of PFOS and PFHxS was reported for the groundwater samples in Q2 2021.

4.3 Porewater

4.3.1 Summary of Field Observations

4.3.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the porewater sampling program are presented in field sampling record sheets, included in Appendix D. Parameters were generally consistent with the previous monitoring event. Porewater pH was near neutral, with a temperature oscillating between 14°C and 20°C (mean=16.4°C). Water was clear and EC/TDS readings indicate saline to highly-saline porewater conditions. DO readings mostly indicate aerobic porewater conditions. No visual or olfactory evidence of contamination were recorded.

4.3.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-2. Laboratory results have also been compared to available historical data. Figure 4 in Appendix A presents the porewater monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-2 Summary of Porewater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	0.56[2]	<0.01	39	0
Sum of PFHxS and PFOS	PW374,	0.07[2]	0.28 (PW340)	39	1
PFOS	PW335, PW340, PW345, PW346, PW350, PW351, PW362, PW364, PW367, PW368, PW374, PW375, PW378, PW381, PW401, PW409	0.01[3]	0.28 (PW340)	39	16

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – drinking water
3. LOR adopted instead of HEPA (2020) guideline value for ecological – 99% species protection

Findings are summarised as follows:

> One porewater sampling location (PW409) reported a first time detect of PFOS (0.01 µg/L) above the laboratory LOR and therefore an exceedance of the ecological criteria. This is also a first-time detect of Sum of PFOS and PFHxS.

4.4 Surface Water

4.4.1 Summary of Field Observations

4.4.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the surface water sampling program are presented in field sampling record sheets, included in Appendix D. Parameters were generally consistent with the previous monitoring event. Surface water pH was near neutral, temperature was 17.59°C on average, water was clear and EC readings (average of 53,972 µS/cm) indicate highly--saline conditions. DO readings indicate aerobic surface water conditions. No visual or olfactory evidence of contamination were recorded.

4.4.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-3. Laboratory results have also been compared to available historical data. Figure 3 in Appendix A presents the surface water monitoring locations where a first time detection of Sum of PFOS and PFHxS or PFOA or a new exceedance of guideline values were reported. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-3 Summary of surface water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	0.56[2]	<0.01	28	0
Sum of PFHxS and PFOS	-	0.07[2]	0.40 (SW305)	28	0
PFOS	SW130, SW132, SW370, SW373	0.01[3]	0.37 (SW305)	28	4

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – drinking water
3. LOR adopted instead of HEPA (2020) guideline value for ecological – 99% species protection

Findings are summarised as follows:

> No first time detect of PFOA or the sum of PFOS and PFHxS above the LOR or new exceedance of guideline values was reported for the surface water monitoring locations.

4.5 Sediment

4.5.1 Summary of Field Observations

Observations recorded during the sediment sampling program are provided in the field sampling record sheets within Appendix D.

4.5.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. Soil criteria are adopted in the absence of criteria for sediment for consistency with the SAQP (Cardno, 2021), DSI (RPS, 2018b) and ERA (RPS, 2018c). A summary of results is presented in Table 4-4. Laboratory results have also been compared to available historical data. Figure 5 in Appendix A presents the sediment monitoring locations. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-4 Summary of Sediment Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (mg/kg)	Max Conc. (mg/kg)	No. Analytical Results[4]	No. Results Above Criteria
PFOA	-	10[1]	<0.0002	39	0
Sum of PFHxS and PFOS	-	20[3]	0.0017 (SD346)	39	0
PFOS	-	0.01[2]	0.0017 (SD346)	39	0

Notes:

1. Ecosystems – open space – direct exposure
2. Ecological - indirect exposure
3. Human health – comm/industrial
4. Non-inclusive of quality control samples

Findings are summarised as follows:

- No exceedance of the adopted assessment criteria was reported for the sediment sampling locations during the Q2 2021 sampling event.
- Two sediment sampling locations (SD351, SD409) reported a first time detect of Sum of PFOS and PFHxS above the laboratory LOR but these didn't exceed the adopted human health and ecological criteria.

4.6 Changes to the Monitoring Network Condition

The following change to the monitoring network was observed:

- Monitoring bore MW199 was found to be banded at approximately 1.5 mbgl. This bore was unable to be repaired with a steel bailer.

No other change to the monitoring network that could have impacted the data integrity was recorded since the Q1 2021 monitoring event.

5 Summary and Conclusions

Cardno undertook the 2021 Q2 groundwater, porewater, surface water and sediment monitoring event at HMAS Stirling as part of the PFAS OMP. Groundwater sampling and testing was undertaken at 60 monitoring bores, 28 surface water locations and 39 sediment and porewater co-located sampling locations. Nine (9) monitoring wells could not be sampled as the wells were found dry (8) or blocked (1).

Groundwater levels were gauged in all wells before sampling. Groundwater flow was interpreted to be radial from the site where mounding of groundwater is occurring (i.e. groundwater flows towards the ocean), consistent with the previous monitoring events.

The groundwater laboratory results reported the following:

- Of the 60 samples that were tested, PFOA (9 samples), PFOS (35 samples) and Sum of PFHxS and PFOS (41 samples) reported concentrations that exceeded adopted assessment criteria.
- One groundwater sampling location (MW220) reported a new exceedance of the HEPA (2020) drinking water criteria (0.56 µg/L) for PFOA. This well had previously reported exceedances of the drinking water criteria for the sum of PFOS and PFHxS.
- No first time detect of PFOA or the sum of PFOS and PFHxS above the LOR where reported for groundwater samples during the 2021 Q2 monitoring event.

The surface water laboratory results reported the following:

- Of the 28 samples tested, PFOS (4 samples) was detected above the adopted ecological 99% species protection criteria (LOR adopted).
- No first time detect of PFOA or the sum of PFOS and PFHxS above the LOR or new exceedance of guideline values was reported for the surface water monitoring locations.

The porewater laboratory results reported the following:

- Of the 39 samples that were tested, PFOS (16 samples) and Sum of PFOS and PFHxS (1 sample) reported concentrations above adopted assessment criteria.
- One porewater sampling location (PW409) reported a first time detect of PFOS (0.01 µg/L) above the laboratory LOR and therefore an exceedance of the ecological criteria. This was also a first-time detect of the sum of PFOS and PFHxS.

The sediment laboratory results reported the following:

- Of the 39 samples that were tested, no sampling locations reported concentrations above adopted assessment criteria.
- Two sediment sampling locations (SD351, SD409) reported a first time detect of the sum of PFOS and PFHxS above the laboratory LOR but below the human health and ecological criteria.

The following actions are recommended to be undertaken prior to the next monitoring event:

- Installation of a new groundwater monitoring bore to replace MW199.
- Installation of new groundwater monitoring bores to replace constantly dry bores MW128, MW214, MW215, MW225 and MW258.

The next OMP sampling event for HMAS Stirling will be the quarterly monitoring event (Q3 2021), scheduled for September 2021. An Annual Interpretive Report will be prepared following the September 2021 monitoring event for the 2020 –2021 reporting period.

6 References

General References

1. Australian Standard AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 – Non-volatile and semi-volatile compounds.
2. Australian Standard AS 4482-1999 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 2 – Volatile substances.
3. Australian Water Quality Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ, 2000).
4. *Contaminated Sites Act 2003*, Western Australia.
5. Department of the Environment and Energy (2017) in the National Greenhouse and Energy Reporting Scheme Measurement Technical Guidelines for the Estimation of Emissions by Facilities in Australia.
6. Department of Environment Regulation (DER), 2014, *Assessment and Management of Contaminated Sites*.
7. Department of Water and Environment Regulation (DWER), 2018, Perth Groundwater Atlas, (https://maps.water.wa.gov.au/#/webmap/gwm).
8. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, '*Guidance on Environmental Data Verification and Data Validation'.*
9. The Heads of EPAs Australia and New Zealand (HEPA; 2020) PFAS National Environmental Management Plan (NEMP) 2.0, January 2020.
10. National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended), registered May 2013.
11. National Health and Medical Research Council (NHMRC) (2011 – updated 2018) National Water Quality Management Strategy Australian Drinking Water Guidelines 6, August 2018
12. NHMRC, August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.
13. Standards Australia/Standards New Zealand (1998) AS5667.1:1998 *'Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples'*.
14. U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
15. USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.

Site Specific References

16. Department of Defence, January 2019, HMAS Stirling Garden Island PFAS Management Area Plan, Final.
17. Cardno, 15 June 2021, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) HMAS Stirling'. Rev 4
18. Cardno, 16 April 2020, PFAS OMP 2019 Q4 Quarterly Monitoring Factual Report, HMAS Stirling
19. Cardno, 14 May 2020, PFAS OMP 2020 Q1 Quarterly Sampling Event Factual Report, HMAS Stirling
20. Cardno, 23 September 2020, PFAS OMP 2020 Q2 Quarterly Sampling Event Factual Report, HMAS Stirling
21. Cardno, 22 January 2021, PFAS OMP 2020 Q3 Quarterly Sampling Event Factual Report, HMAS Stirling
22. Cardno, March 2021, PFAS OMP 2020 Q4 Quarterly Sampling Event Factual Report, HMAS Stirling
23. Cardno, June 2021, PFAS OMP 2021 Q1 Quarterly Sampling Event Factual Report, HMAS Stirling
24. RPS, October 2018, HMAS Stirling - PFAS Ongoing Monitoring Plan, Ref. EEC16094.005 (RPS, 2018a).
25. RPS, May 2018, Detailed Site Investigation – HMAS Stirling PFAS Investigation, Ref. EEC16094.003 (RPS, 2018b).

26. RPS, September 2018, HMAS Stirling Garden Island PFAS Investigation Ecological Risk Assessment. Ref. EEC16094.009 (RPS, 2018c).

APPENDIX A

FIGURES

FIGURE 1A

1:32,000 Scale at A3

Meters

0 500 1,000

Site Location

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-07-26 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-001_RegionalLocation 02.mxd
Aerial Imagery Supplied by Google Map

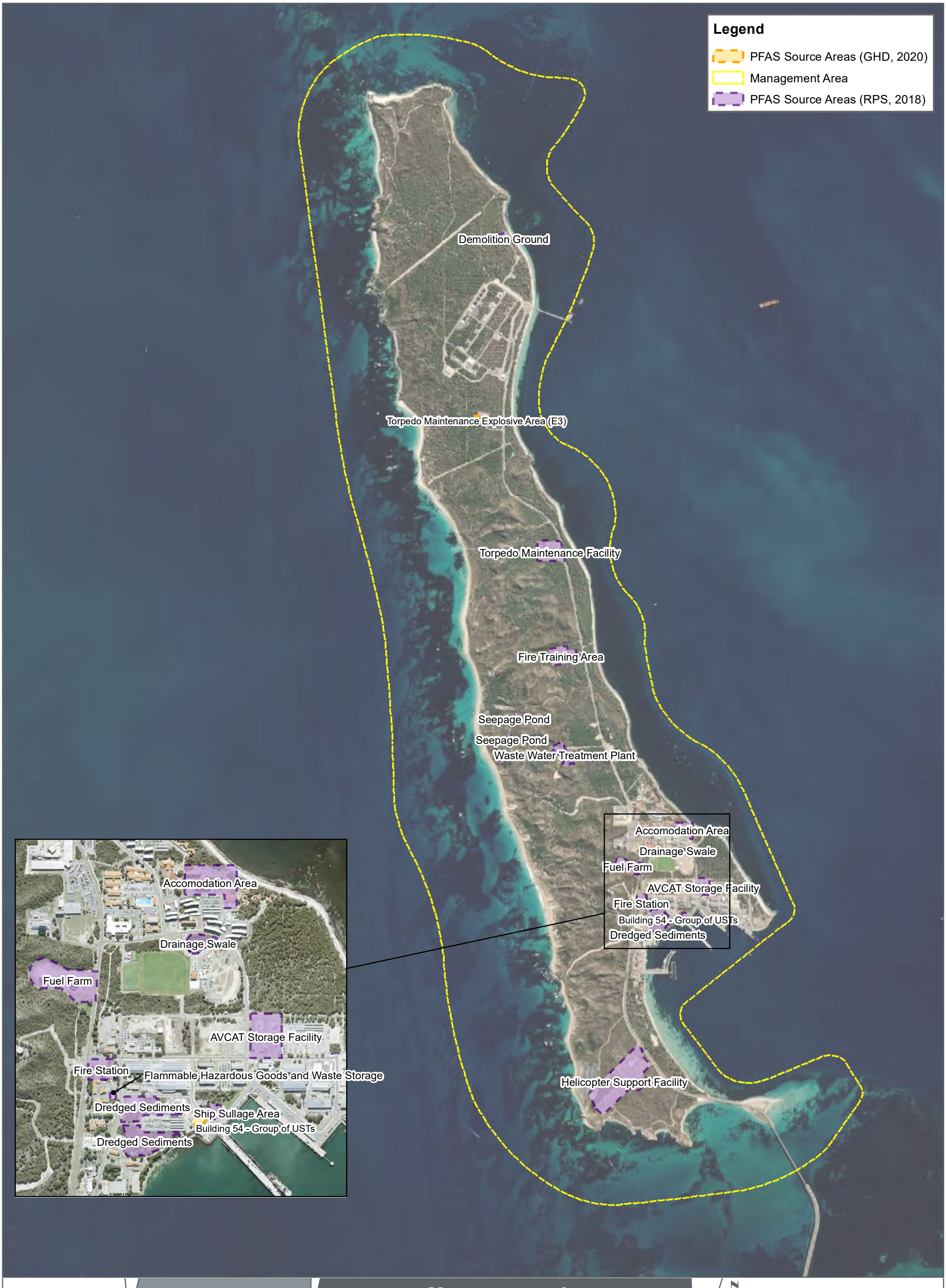

FIGURE 1B

1:32,000 Scale at A3

Meters

0 500 1,000

Management Area

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-001B_ManagementArea 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

Notes:
99%SP: Ecological criteria for 99% species protection (HEPA, 2020)

MW124
MW112
MW128
MW125
MW120
MW123
MW126
MW121
MW127
MW158
MW161
MW166
MW172
MW173
MW195D
MW195S
MW196
MW197
MW171
MW199
MW200
MW193
MW203
MW202
MW288
MW289
MW233
MW236
MW238
MW239
MW242
MW243
MW245
MW249
MW517
MW256
MW516
MW248
MW259
MW264
MW255
MW261
MW258
MW010
MW269
MW268
MW228
MW217
MW220
MW227
MW214
MW216
MW226
MW224
MW282
MW225
MW215

MW109
MW117

MW240
MW257
MW518

MW220
PFOS>99%SP

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

Groundwater Results Summary

- No first detect or new exceedance
- First time detect of PFOA or PFOS+PFHxS
- New exceedance of guideline value
- Not Sampled

FIGURE 2A
1:12,500 Scale at A3
Meters
0 300 600

Groundwater Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-07-07 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-002A_2021Q2_GWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

MW137
MW142
MW141
MW147
MW272
MW139
MW149
MW141
MW272
MW149
MW139
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Groundwater Results Summary
No first detect or new exceedance
First time detect of PFOA or PFOS+PFHxS
New exceedance of guideline value
Not Sampled
FIGURE 2B
1:15,000 Scale at A3
Meters
0
250
500
Groundwater Results
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-07-07 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-002B_2021Q2_GWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

FIGURE 3A

1:15,000 Scale at A3

Meters

0 300 600

Surface water Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003A_2021Q2_SWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

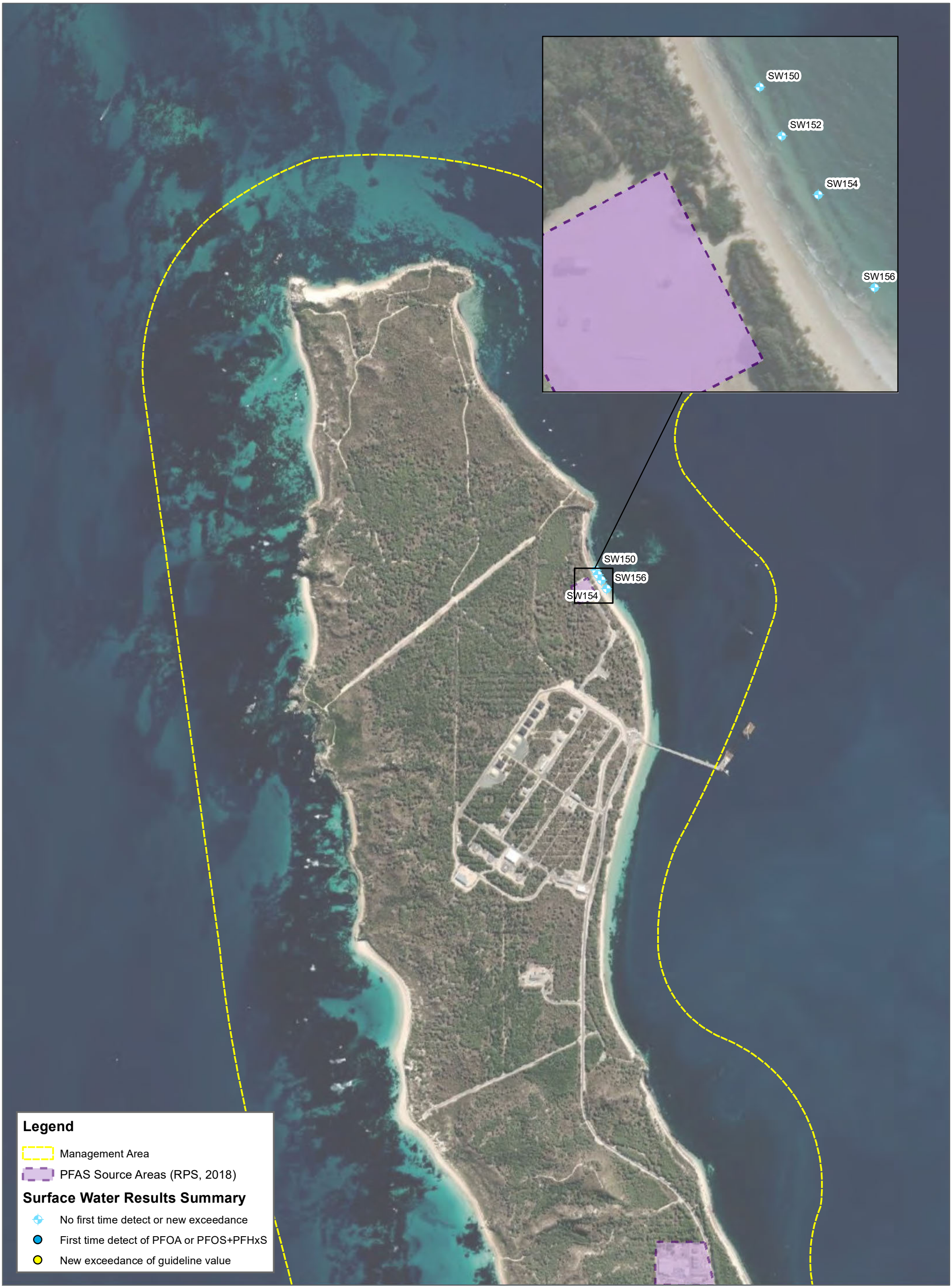

FIGURE 3B

1:15,000 Scale at A3

Meters

0 300 600

Surface water Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-07-07 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003B_2021Q2_SWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

Notes:
99%SP: Ecological criteria for 99% species protection (HEPA, 2020)

PW335
PW364
PW362
PW340
PW363
PW341
PW350
PW401
PW380
PW351
PW381
PW352
PW369
PW345
PW367
PW368
PW304
PW346
PW314
PW315
PW306
PW307
PW316
PW308
PW378
PW375
PW374
PW405
PW407
PW409
PFOS>99%SP
PW409
PW411
PW413
PW306
PW315
PW316
PW415
PW308
PW307

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

Pore water Results Summary

- No first detect or new exceedance
- First time detect of PFOA or PFOS+PFHxS
- New exceedance of guideline value

FIGURE 4A
1:15,000 Scale at A3
Meters
0 300 600

Porewater Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-004A_2021Q2_PWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

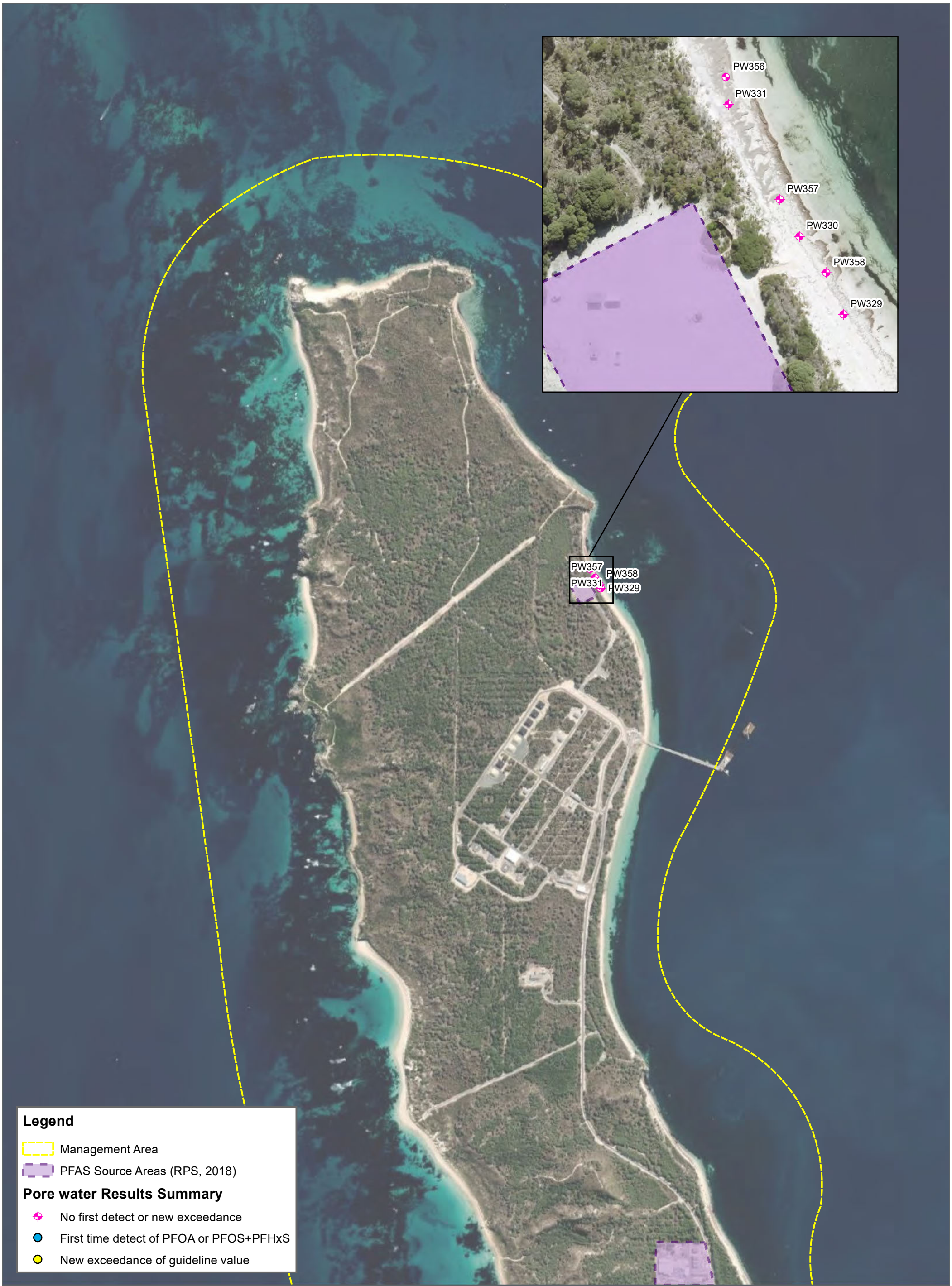

FIGURE 4B

1:15,000 Scale at A3

Meters

0 300 600

Porewater Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-07-07 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-004B_2021Q2_PWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

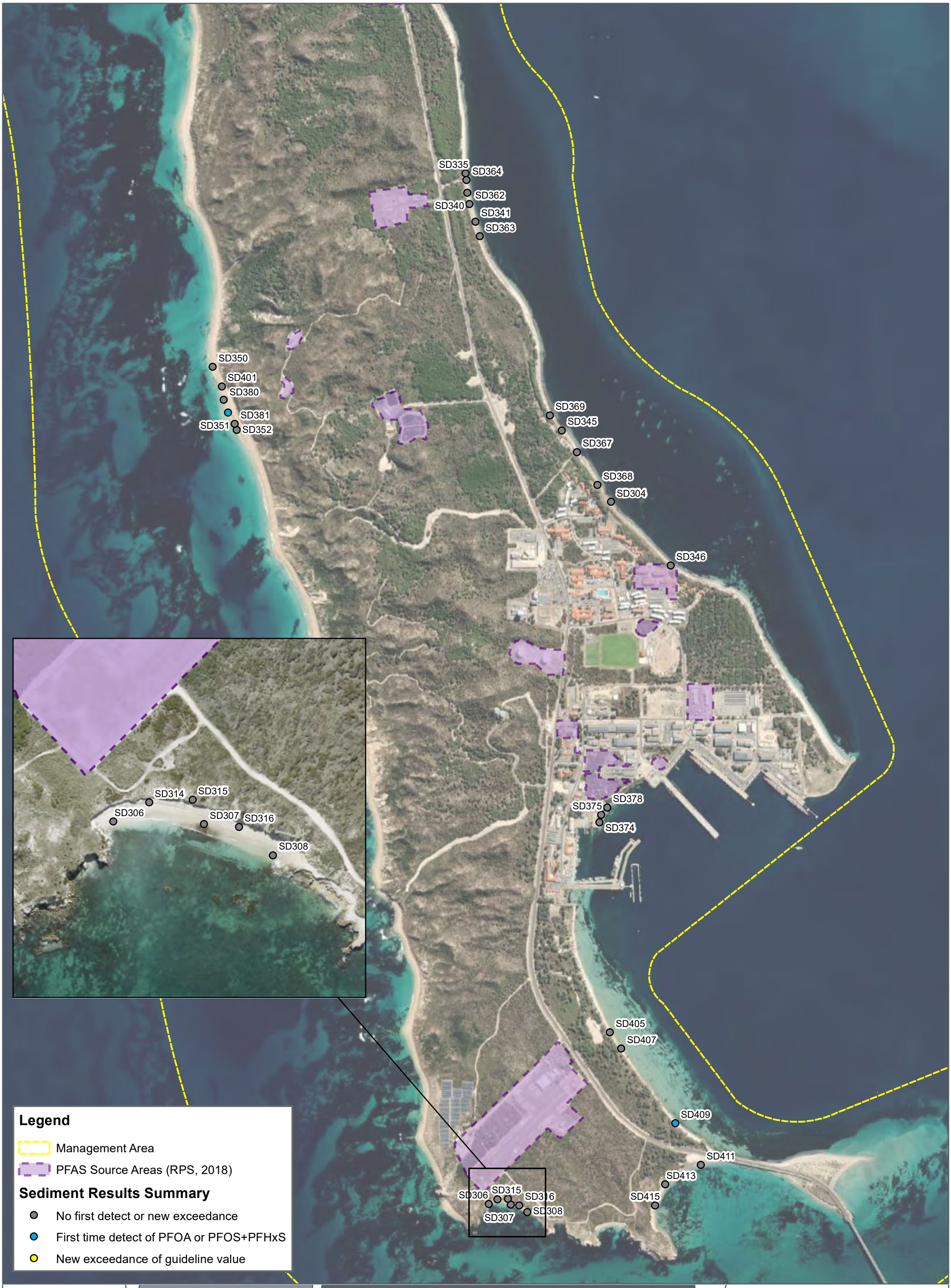

FIGURE 5A

1:15,000 Scale at A3

Meters

0 300 600

Sediment Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-005A_2021Q2_SDResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

FIGURE 5B

1:15,000 Scale at A3

Meters

0 300 600

Sediment Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-07-07 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-005B_2021Q2_SDResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

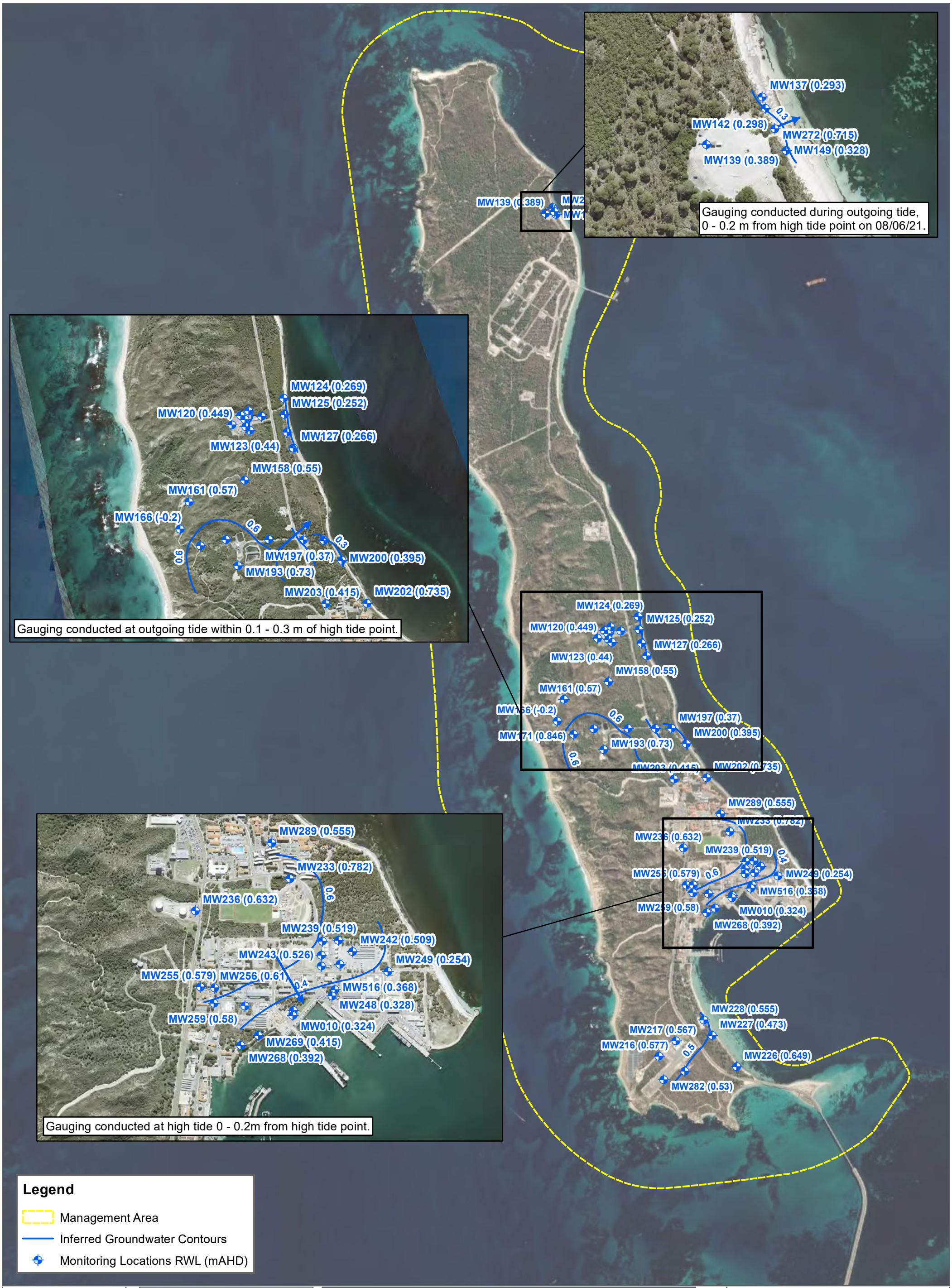

FIGURE 6

1:32,000 Scale at A3

Meters

0 500 1,000

Inferred Groundwater Contours

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-006_2021Q2_GroundwaterContours 02.mxd
Aerial Imagery Supplied by Google Earth & Metromap

APPENDIX

B

DATA ASSESSMENT TABLES

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - Fluorotelomer Sulfonic Acids				PFAS - Perf		
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.02	0.05	0.02
PFAS NEMP 2020 Ecological 99% species protection					LOR*																			
PFAS NEMP 2020 Drinking Water											*0.56*													
PFAS NEMP 2020 Recreational Water											10													

Field ID	Date	Location Code	Lab Report Number																							
0089_MW010_210609	9/06/2021	MW010	EP2106516	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW109_210608	8/06/2021	MW109	EP2106448	0.43	0.94	15.2	1.99	38.0	<0.02	0.2	3.70	0.64	0.25	*0.94*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW112_210608	8/06/2021	MW112	EP2106448	0.16	1.01	30.4	4.54	26.8	<0.02	0.2	2.95	0.56	0.53	*3.76*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.19	<0.05	<0.05	0.25	<0.05	<0.02
0089_MW117_210608	8/06/2021	MW117	EP2106448	0.46	0.99	18.6	2.22	47.3	<0.02	0.3	3.96	0.68	0.27	*1.02*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW120_210608	8/06/2021	MW120	EP2106448	0.05	0.05	2.25	0.45	3.88	<0.02	<0.1	0.17	0.03	<0.02	0.13	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW121_210608	8/06/2021	MW121	EP2106448	0.09	0.30	10.5	0.39	2.86	<0.02	0.1	0.99	0.26	0.16	0.28	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW123_210608	8/06/2021	MW123	EP2106448	0.16	0.13	0.68	<0.02	0.07	<0.02	<0.1	0.62	0.14	0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW124_210608	8/06/2021	MW124	EP2106448	0.12	0.26	1.57	0.03	0.17	<0.02	<0.1	0.42	0.07	0.03	0.05	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW125_210608	8/06/2021	MW125	EP2106448	<0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW126_210608	8/06/2021	MW126	EP2106448	0.11	0.10	0.30	<0.02	0.02	<0.02	<0.1	0.10	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW127_210608	8/06/2021	MW127	EP2106448	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW137_210608	8/06/2021	MW137	EP2106464	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW139_210608	8/06/2021	MW139	EP2106464	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW141_210608	8/06/2021	MW141	EP2106464	0.38	0.76	10.8	0.79	34.9	<0.02	0.2	7.77	0.75	0.23	*0.91*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW142_210608	8/06/2021	MW142	EP2106464	0.09	0.21	4.21	0.12	2.50	<0.02	<0.1	2.02	0.21	0.06	0.30	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW149_210608	8/06/2021	MW149	EP2106464	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW158_210610	10/06/2021	MW158	EP2106588	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW161_210610	10/06/2021	MW161	EP2106588	0.05	0.06	0.76	0.10	6.04	<0.02	<0.1	0.21	0.27	0.08	0.09	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW166_210610	10/06/2021	MW166	EP2106588	0.04	0.10	2.27	0.49	8.51	<0.02	0.1	0.37	0.34	0.17	0.16	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW171_210610	10/06/2021	MW171	EP2106588	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW173_210610	10/06/2021	MW173	EP2106579	0.29	0.31	6.64	1.21	6.41	<0.02	0.1	0.80	0.32	0.25	*1.10*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.23	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW193_210610	10/06/2021	MW193	EP2106580	0.89	1.06	8.21	0.45	1.90	<0.02	0.2	2.01	0.36	0.17	0.49	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW195D_210609	9/06/2021	MW195D	EP2106514	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	0.08	0.10	0.05	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	2.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW195S_210609	9/06/2021	MW195S	EP2106514	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW196_210610	10/06/2021	MW196	EP2106579	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW197_210609	9/06/2021	MW197	EP2106514	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW200_210609	9/06/2021	MW200	EP2106514	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW202_210610	10/06/2021	MW202	EP2106588	<0.02	<0.02	0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW203_210609	9/06/2021	MW203	EP2106514	<0.02	<0.02	0.09	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW216_210609	9/06/2021	MW216	EP2106514	0.51	0.53	3.50	0.15	1.07	<0.02	0.9	1.85	3.57	0.38	0.39	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	3.81	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW217_210609	9/06/2021	MW217	EP2106514	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	1.8	4.33	6.98	0.70	0.38	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	<0.05	32.6	0.29	<0.05	<0.02	<0.05	<0.02
0089_MW220_210609	9/06/2021	MW220	EP2106514	0.18	0.17	3.61	0.46	9.38	<0.02	0.2	0.55	0.40	0.19	*0.60*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.15	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW224_210609	9/06/2021	MW224	EP2106514	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW226_210610	10/06/2021	MW226	EP2106588	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW227_210610	10/06/2021	MW227	EP2106588	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW228_210610	10/06/2021	MW228	EP2106588	0.07	<0.02	<0.02	<0.02	<0.01	<0.02	1.1	4.65	5.09	0.70	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW233_210609	9/06/2021	MW233	EP2106515	<0.02	<0.02	0.08	<0.02	0.10	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW236_210610	10/06/2021	MW236	EP2106579	0.18	0.36	11.3	0.50	42.2	<0.02	<0.1	0.78	0.12	0.25	*1.27*	<0.02	<0.02	1.98	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW238_210610	10/06/2021	MW238	EP2106580	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW239_210610	10/06/2021	MW239	EP2106579	0.03	0.07	0.03	<0.02	0.01	<0.02	<0.1	0.07	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW240_210610	10/06/2021	MW240	EP2106580	0.02	0.21	3.24	0.12	<0.01	<0.02	<0.1	0.21	0.02	0.03	0.16	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW242_210609	9/06/2021	MW242	EP2106516	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW243_210610	10/06/2021	MW243	EP2106579	<0.02	<0.02	0.07	<0.02	0.70	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW245_210610	10/06/2021	MW245	EP2106579	<0.02	<0.02	0.05	<0.02	0.14	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW248_210609	9/06/2021	MW248	EP2106516	0.19	0.18	1.48	0.09	0.66	<0.02	<0.1	0.25	<0.02	0.06	0.13	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW249_210609	9/06/2021	MW249	EP2106515	<0.02	<0.02	0.14	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW255_210610	10/06/2021	MW255	EP2106580	0.07	0.08	1.15	<0.02	0.53	<0.02	<0.1	0.17	0.04	0.04	0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW256_210610	10/06/2021	MW256	EP2106579	1.28	3.05	38.8	2.11	36.2	<0.02	0.3	3.96	0.67	0.70	*2.34*	<0.02	<0.02	0.10	<0.05	<0.02	<0.02	<0.05	0.14	<0.05	<0.05	0.08	<0.05	<0.02
0089_MW257_210609	9/06/2021	MW257	EP2106516	<0.02	<0.02	0.03	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW259_210610	10/06/2021	MW259	EP2106580	<0.02	0.04	0.13	<0.02	0.41	<0.02	<0.1	0.16	0.09	0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW261_210609	9/06/2021	MW261	EP2106516	<0.02	<0.02	0.11	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW264_210609	9/06/2021	MW264	EP2106515	<0.02	<0.02	0.06	<0.02	1.19	<0.02	<0.1	<0.02	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW268_210609	9/06/2021	MW268	EP2106515	0.05	0.09	0.28	<0.02	<0.01	<0.02	<0.1	0.06	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW269_210609	9/06/2021	MW269	EP2106515	0.09	0.13	0.60	<0.02	0.45	<0.02	<0.1	0.13	0.03	<0.02	0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW272_210608	8/06/2021	MW272	EP2106464	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW282_210609	9/06/2021	MW282	EP2106514	4.89	7.83	42.7	3.15	40.3	<0.02	1.4	16.9	2.75	2.94	*4.50*	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW289_210609	9/06/2021	MW289	EP2106516	0.10	0.09	0.51	0.03	2.01	<0.02	<0.1	0.07	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW516_210609	9/06/2021	MW516	EP2106515	0.16	0.11	1.40	0.12	9.21	<0.02	<0.1	0.15	<0.02	0.03	0.10	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW517_210609	9/06/2021	MW517	EP2106516	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
0089_MW518_210609	9/06/2021	MW518	EP2106515	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02

Notes:
First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value
*LOR value adopted for PFOS

				fluoroalkyl Sulfonamides				PFAS			Inorganics															Metals		
				N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Sum of PFAS	Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	pH (Lab)	Sodium (filtered)	Sulphate as SO4 - Turbidimetric (filtered)	TDS	TOC	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	pH Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting				0.05	0.05	0.02	0.05	0.01	0.01	0.01	1	1	1	1	0.01	0.01	1	0.01	0.01	1	1	10	1	5	1	1	1
PFAS NEMP 2020 Ecological 99% species protection																											
PFAS NEMP 2020 Drinking Water									*0.07*																		
PFAS NEMP 2020 Recreational Water									2																		
Field ID	Date	Location Code	Lab Report Number																								
0089_MW010_210609	9/06/2021	MW010	EP2106516	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	431	<1	431	46.0	47.4	1,160	1.46	8.16	760	224	2,600	9	32	84	107	51
0089_MW109_210608	8/06/2021	MW109	EP2106448	<0.05	<0.05	<0.02	<0.05	59.4	*53.2*	62.4	<1	344	<1	344	10.0	10.1	96	0.62	7.81	65	21	544	8	408	106	24	2
0089_MW112_210608	8/06/2021	MW112	EP2106448	<0.05	<0.05	<0.02	<0.05	65.6	*57.2*	71.4	<1	228	<1	228	6.13	6.15	33	0.14	7.94	23	31	362	6	316	84	11	2
0089_MW117_210608	8/06/2021	MW117	EP2106448	<0.05	<0.05	<0.02	<0.05	72.6	*65.9*	75.9	<1	454	<1	454	10.8	10.1	36	3.55	7.65	24	37	626	14	352	150	18	4
0089_MW120_210608	8/06/2021	MW120	EP2106448	<0.05	<0.05	<0.02	<0.05	6.51	*6.13*	7.01	<1	235	<1	235	6.26	6.73	40	3.61	7.97	29	21	360	6	40	80	17	3
0089_MW121_210608	8/06/2021	MW121	EP2106448	<0.05	<0.05	<0.02	<0.05	15.3	*13.4*	16.0	<1	218	<1	218	6.40	7.10	54	5.16	8.05	29	25	476	5	59	89	16	3
0089_MW123_210608	8/06/2021	MW123	EP2106448	<0.05	<0.05	<0.02	<0.05	1.69	*0.75*	1.82	<1	334	<1	334	9.28	8.47	88	4.56	7.76	53	6	518	24	5,200	94	17	3
0089_MW124_210608	8/06/2021	MW124	EP2106448	<0.05	<0.05	<0.02	<0.05	2.43	*1.74*	2.72	<1	360	<1	360	462	482	14,700	2.14	7.55	8,200	1,920	33,000	13	92	447	1,110	459
0089_MW125_210608	8/06/2021	MW125	EP2106448	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	407	<1	407	484	516	15,400	3.27	7.54	8,770	1,980	34,900	8	26	471	1,200	499
0089_MW126_210608	8/06/2021	MW126	EP2106448	<0.05	<0.05	<0.02	<0.05	0.55	*0.32*	0.65	<1	444	<1	444	448	485	14,200	3.95	7.51	8,180	1,870	24,500	11	64	451	1,160	448
0089_MW127_210608	8/06/2021	MW127	EP2106448	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	478	<1	478	447	471	14,200	2.63	7.42	7,940	1,770	31,900	20	130	398	1,150	440
0089_MW137_210608	8/06/2021	MW137	EP2106464	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	183	<1	183	541	591	17,300	4.44	7.75	10,300	2,370	39,200	6	197	443	1,320	492
0089_MW139_210608	8/06/2021	MW139	EP2106464	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	155	<1	155	34.1	33.6	993	0.70	8.00	486	145	2,310	2	22	106	80	25
0089_MW141_210608	8/06/2021	MW141	EP2106464	<0.05	<0.05	<0.02	<0.05	55.9	*45.7*	57.5	<1	400	<1	400	346	350	11,000	0.62	7.61	5,920	1,320	23,000	6	94	396	784	323
0089_MW142_210608	8/06/2021	MW142	EP2106464	<0.05	<0.05	<0.02	<0.05	9.39	*6.71*	9.72	<1	324	<1	324	400	415	12,800	1.86	7.66	7,070	1,550	27,000	9	124	401	941	392
0089_MW149_210608	8/06/2021	MW149	EP2106464	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	350	<1	350	444	478	14,000	3.71	7.66	8,210	2,020	31,800	4	431	386	1,080	504
0089_MW158_210610	10/06/2021	MW158	EP2106588	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	418	<1	418	152	144	4,700	2.41	7.84	2,360	508	9,280	12	5	204	348	113
0089_MW161_210610	10/06/2021	MW161	EP2106588	<0.05	<0.05	<0.02	<0.05	7.50	*6.80*	7.68	<1	324	<1	324	32.1	33.8	792	2.69	7.71	446	156	2,090	12	686	139	79	39
0089_MW166_210610	10/06/2021	MW166	EP2106588	<0.05	<0.05	<0.02	<0.05	12.0	*10.8*	12.6	<1	515	<1	515	47.1	50.5	1,150	3.45	7.99	686	212	2,990	9	66	153	142	53
0089_MW171_210610	10/06/2021	MW171	EP2106588	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	429	<1	429	149	172	4,520	7.32	7.83	2,830	606	10,200	5	13	219	427	118
0089_MW173_210610	10/06/2021	MW173	EP2106579	<0.05	<0.05	<0.02	<0.05	16.1	*13.0*	17.7	<1	668	<1	668	40.3	39.5	813	1.02	7.72	544	194	2,210	45	61	82	126	54
0089_MW193_210610	10/06/2021	MW193	EP2106580	<0.05	<0.05	<0.02	<0.05	14.2	*10.1*	15.7	<1	492	<1	492	35.9	37.1	843	1.58	7.71	480	111	2,180	36	2,160	123	111	36
0089_MW195D_210609	9/06/2021	MW195D	EP2106514	<0.05	<0.05	<0.02	<0.05	2.30	0.02	2.30	<1	224	<1	224	281	305	8,930	4.08	7.81	5,080	1,180	18,400	4	187	365	719	253
0089_MW195S_210609	9/06/2021	MW195S	EP2106514	<0.05	<0.05	<0.02	<0.05	0.02	0.01	0.02	<1	570	<1	570	51.5	53.9	1,170	2.26	7.79	679	343	3,180	18	45	197	160	54
0089_MW196_210610	10/06/2021	MW196	EP2106579	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	210	<1	210	5.54	6.53	32	8.27	8.00	28	21	396	5	1,200	72	20	3
0089_MW197_210609	9/06/2021	MW197	EP2106514	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	506	<1	506	56.8	58.3	1,540	1.28	7.84	895	158		38		80	170	55
0089_MW200_210609	9/06/2021	MW200	EP2106514	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	451	<1	451	91.5	95.4	2,710	2.09	7.89	1,690	290	5,440	3	37	125	160	97
0089_MW202_210610	10/06/2021	MW202	EP2106588	<0.05	<0.05	<0.02	<0.05	0.07	0.07	0.07	<1	320	<1	320	11.3	11.6	137	1.12	7.92	94	52	664	9	<5	104	26	7
0089_MW203_210609	9/06/2021	MW203	EP2106514	<0.05	<0.05	<0.02	<0.05	0.11	*0.11*	0.11	<1	274	<1	274	7.83	10.1	45	12.5	7.75	51	52	564	6	33	87	41	5
0089_MW216_210609	9/06/2021	MW216	EP2106514	<0.05	<0.05	<0.02	<0.05	16.0	*4.57*	16.7	<1	310	<1	310	17.8	17.4	361	1.36	7.88	154	70	1,080	11	252	144	40	7
0089_MW217_210609	9/06/2021	MW217	EP2106514	<0.05	<0.05	<0.02	<0.05	47.1	0.02	47.1	<1	240	<1	240	6.57	7.70	52	7.89	7.80	34	15	472	1	60	105	11	3
0089_MW220_210609	9/06/2021	MW220	EP2106514	<0.05	<0.05	<0.02	<0.05	15.3	*13.0*	15.9																	
0089_MW224_210609	9/06/2021	MW224	EP2106514	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	216	<1	216	8.29	8.85	112	3.30	8.09	88	39	504	1	121	64	21	4
0089_MW226_210610	10/06/2021	MW226	EP2106588	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	561	<1	561	476	535	14,800	5.88	7.62	9,100	2,250	31,200	80	88	452	1,250	538
0089_MW227_210610	10/06/2021	MW227	EP2106588	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	315	<1	315	50.1	54.5	1,410	4.22	8.02	883	193	3,340	18	60	132	99	53
0089_MW228_210610	10/06/2021	MW228	EP2106588	<0.05	<0.05	<0.02	<0.05	11.6	<0.01	11.6	<1	328	<1	328	356	355	11,300	0.18	7.70	6,050	1,500	23,100	42	393	310	830	324
0089_MW233_210609	9/06/2021	MW233	EP2106515	<0.05	<0.05	<0.02	<0.05	0.18	*0.18*	0.18	<1	121	<1	121	2.92	3.01	14	1.60	8.04	15	5	186	4	80	38	5	2
0089_MW236_210610	10/06/2021	MW236	EP2106579	<0.05	<0.05	<0.02	<0.05	56.1	*53.5*	58.9	<1	243	<1	243	6.20	7.12	36	6.86	8.05	19	16	420	5	85	97	17	2
0089_MW238_210610	10/06/2021	MW238	EP2106580	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	198	<1	198	6.60	7.27	42	4.82	8.10	32	70	460	6	169	86	18	4
0089_MW239_210610	10/06/2021	MW239	EP2106579	<0.05	<0.05	<0.02	<0.05	0.14	0.04	0.21	<1	225	<1	225	7.00	7.26	32	1.82	7.99	27	77	412	4	69	82	23	4
0089_MW240_210610	10/06/2021	MW240	EP2106580	<0.05	<0.05	<0.02	<0.05	3.68	*3.24*	4.01	<1	249	<1	249	8.12	9.08	59	5.63	8.00	34	71	620	6	89	124	16	4
0089_MW242_210609	9/06/2021	MW242	EP2106516	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	188	<1	188	5.53	5.65	40	1.08	8.02	28	31		1		67	12	4
0089_MW243_210610	10/06/2021	MW243	EP2106579	<0.05	<0.05	<0.02	<0.05	0.77	*0.77*	0.77	<1	258	<1	258	7.26	8.13	42	5.70	8.09	31	44	469	4	93	106	16	7
0089_MW245_210610	10/06/2021	MW245	EP2106579	<0.05	<0.05	<0.02	<0.05	0.19	*0.19*	0.19	<1	601	<1	601	12.7	12.3	23	1.52	7.30	24	3	753	107	34	187	22	6
0089_MW248_210609	9/06/2021	MW248	EP2106516	<0.05	<0.05	<0.02	<0.05	2.77	*2.14*	3.04	<1	428	<1	428	16.2	15.9	141	1.18	7.87	128	179	934	17	7	121	46	19
0089_MW249_210609	9/06/2021	MW249	EP2106515	<0.05	<0.05	<0.02	<0.05	0.22	*0.22*	0.22	<1	435	<1	435	13.4	12.6	150	3.27	7.81	113	25	724	20	1,610	91	35	10
0089_MW255_210610	10/06/2021	MW255	EP2106580	<0.05	<0.05	<0.02	<0.05	2.06	*1.68*	2.14	<1	352	<1	352	9.46	9.34	64	0.63	7.92	66	30	554	36	7,590	98	18	4
0089_MW256_210610	10/06/2021	MW256	EP2106579	<0.05	<0.05	<0.02	<0.05	84.4	*75.0*	89.7	<1	492	<1	492	15.2	15.1	184	0.32	7.70	95	7	819	21	267	150	41	3
0089_MW257_210609	9/06/2021	MW257	EP2106516	<0.05	<0.05	<0.02	<0.05	0.13	*0.11*	0.13	<1	158	<1	158	3.77	4.04	16	3.42	8.21	15	8	243	2	134	57	6	2
0089_MW259_210610	10/06/2021	MW259	EP2106580	<0.05	<0.05	<0.02	<0.05	0.81	*0.54*	0.85	<1	224	<1	224	5.84	6.08	36	1.96	7.93	27	17	324	5	86	72	15	3
0089_MW261_210609	9/06/2021	MW261	EP2106516	<0.05	<0.05	<0.02	<0.05	0.11	*0.11*	0.11	<1	408	<1	408	29.0	28.5	615	0.88	8.11	363	167	1,690	25	16	143	59	27
0089_MW264_210609	9/06/2021	MW264	EP2106515	<0.05	<0.05	<0.02	<0.05	1.27	*1.25*	1.27	<1	388	<1	388	11.8	11.4	98	1.60	7.95	92	61	644	12	176	82	36	14
0089_MW268_210609	9/06/2021	MW268	EP2106515	<0.05	<0.05	<0.02	<0.05	0.39	*0.28*	0.48	<1	413	<1	413	130	128	3,770	0.45	7.73	2,080	728	8,430	15	70	211	302	107
0089_MW269_210609	9/06/2021	MW269	EP2106515	<0.05	<0.05	<0.02	<0.05	1.31	*1.05*	1.44	<1	443	<1	443	24.1	21.5	470	5.69	7.94	275	98	1,310	13	55	73	66	20
0089_MW272_210608	8/06/2021	MW272	EP2106464	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	154	<1	154	537	581	17,200	3.93	7.69	10,100	2,340	37,700	2	45	444	1,300	488
0089_MW282_210609	9/06/2021	MW282	EP2106514	<0.05	<0.05	<0.02	<0.05	116	*83.0*	127	<1	571	<1	571	14.4	15.0	89	1.94	7.73	63	24	850	37	375	195	30	2
0089_MW289_210609	9/06/2021	MW289	EP2106516	<0.05	<0.05	<0.02	<0.05	2.73	*2.52*	2.85	<1	344	<1	344	10.1	10.7	65	2.84	8.12	76	66	548	2	38	93	30	10
0089_MW516_210609	9/06/2021	MW516	EP2106515	<0.05	<0.05	<0.02	<0.05	11.0	*10.6*	11.3	<1	499	<1	499	15.8	15.5	149	0.90	7.66	104	79	934	28	124	147	40	15
0089_MW517_210609	9/06/2021	MW517	EP2106516	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	316	<1	316	8.88	10.0	86	6.11	7.85	68	7	562	4	107	119	13	3
0089_MW518_210609	9/06/2021	MW518	EP2106515	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	359	<1	359	22.1	20.2	412	4.58	8.00	214	160	1,320	13	219	112	59	17

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

*LOR value adopted for PFOS

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02
PFAS NEMP 2020 Ecological 99% species protection					LOR*												
PFAS NEMP 2020 Drinking Water											*0.56*						
PFAS NEMP 2020 Recreational Water											10						
Field ID	Date	Location Code	Lab Report Number														
0089_PW304_210610	10/06/2021	PW304	EP2106582	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW306_210609	9/06/2021	PW306	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW307_210609	9/06/2021	PW307	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW308_210609	9/06/2021	PW308	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW314_210609	9/06/2021	PW314	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW315_210609	9/06/2021	PW315	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW316_210609	9/06/2021	PW316	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW329_210608	8/06/2021	PW329	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW330_210608	8/06/2021	PW330	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW331_210608	8/06/2021	PW331	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW335_210608	8/06/2021	PW335	EP2106465	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW340_210608	8/06/2021	PW340	EP2106450	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW341_210608	8/06/2021	PW341	EP2106450	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW345_210609	9/06/2021	PW345	EP2106517	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW346_210610	10/06/2021	PW346	EP2106580	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW350_210608	8/06/2021	PW350	EP2106450	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW351_210608	8/06/2021	PW351	EP2106450	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW352_210608	8/06/2021	PW352	EP2106450	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW356_210608	8/06/2021	PW356	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW357_210608	8/06/2021	PW357	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW358_210608	8/06/2021	PW358	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW362_210608	8/06/2021	PW362	EP2106450	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW363_210608	8/06/2021	PW363	EP2106450	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW364_210608	8/06/2021	PW364	EP2106465	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW367_210609	9/06/2021	PW367	EP2106517	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW368_210610	10/06/2021	PW368	EP2106582	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW369_210609	9/06/2021	PW369	EP2106517	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW374_210610	10/06/2021	PW374	EP2106582	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW375_210610	10/06/2021	PW375	EP2106582	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW378_210610	10/06/2021	PW378	EP2106582	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW380_210608	8/06/2021	PW380	EP2106450	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW381_210608	8/06/2021	PW381	EP2106450	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW401_210608	8/06/2021	PW401	EP2106450	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW405_210610	10/06/2021	PW405	EP2106590	<0.02	0.03	<0.02	<0.02	<0.01	<0.02	<0.1	0.06	0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW407_210610	10/06/2021	PW407	EP2106590	<0.02	<0.02	<0.02	<0.02	<0.01	0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW409_210610	10/06/2021	PW409	EP2106590	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW411_210609	9/06/2021	PW411	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW413_210609	9/06/2021	PW413	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
0089_PW415_210609	9/06/2021	PW415	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

*LOR value adopted for PFOS

	PFAS - Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS					
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Sum of PFAS	Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting	0.05	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01	1	1	1
PFAS NEMP 2020 Ecological 99% species protection																	
PFAS NEMP 2020 Drinking Water													*0.07*				
PFAS NEMP 2020 Recreational Water													2				

Field ID	Date	Location Code	Lab Report Number															
0089_PW304_210610	10/06/2021	PW304	EP2106582	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	657	<1
0089_PW306_210609	9/06/2021	PW306	EP2106519	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	115	<1
0089_PW307_210609	9/06/2021	PW307	EP2106519	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1
0089_PW308_210609	9/06/2021	PW308	EP2106519	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	111	<1
0089_PW314_210609	9/06/2021	PW314	EP2106519	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	109	<1
0089_PW315_210609	9/06/2021	PW315	EP2106519	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1
0089_PW316_210609	9/06/2021	PW316	EP2106519	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1
0089_PW329_210608	8/06/2021	PW329	EP2106465	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	146	<1
0089_PW330_210608	8/06/2021	PW330	EP2106465	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	138	<1
0089_PW331_210608	8/06/2021	PW331	EP2106465	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	110	<1
0089_PW335_210608	8/06/2021	PW335	EP2106465	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	125	<1
0089_PW340_210608	8/06/2021	PW340	EP2106450	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	111	<1
0089_PW341_210608	8/06/2021	PW341	EP2106450	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	123	<1
0089_PW345_210609	9/06/2021	PW345	EP2106517	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	145	<1
0089_PW346_210610	10/06/2021	PW346	EP2106580	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	271	<1
0089_PW350_210608	8/06/2021	PW350	EP2106450	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	114	<1
0089_PW351_210608	8/06/2021	PW351	EP2106450	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	105	<1
0089_PW352_210608	8/06/2021	PW352	EP2106450	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1
0089_PW356_210608	8/06/2021	PW356	EP2106465	<0.05	0.12	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.12	<0.01	0.12	<1	110	<1
0089_PW357_210608	8/06/2021	PW357	EP2106465	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	142	<1
0089_PW358_210608	8/06/2021	PW358	EP2106465	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	125	<1
0089_PW362_210608	8/06/2021	PW362	EP2106450	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	128	<1
0089_PW363_210608	8/06/2021	PW363	EP2106450	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	120	<1
0089_PW364_210608	8/06/2021	PW364	EP2106465	<0.05	0.07	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	0.02	0.09	<1	116	<1
0089_PW367_210609	9/06/2021	PW367	EP2106517	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	176	<1
0089_PW368_210610	10/06/2021	PW368	EP2106582	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	219	<1
0089_PW369_210609	9/06/2021	PW369	EP2106517	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	130	<1
0089_PW374_210610	10/06/2021	PW374	EP2106582	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.08	*0.08*	0.08	<1	120	<1
0089_PW375_210610	10/06/2021	PW375	EP2106582	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	118	<1
0089_PW378_210610	10/06/2021	PW378	EP2106582	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05	<1	131	<1
0089_PW380_210608	8/06/2021	PW380	EP2106450	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	120	<1
0089_PW381_210608	8/06/2021	PW381	EP2106450	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	115	<1
0089_PW401_210608	8/06/2021	PW401	EP2106450	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	116	<1
0089_PW405_210610	10/06/2021	PW405	EP2106590	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.11	<0.01	0.14	<1	206	<1
0089_PW407_210610	10/06/2021	PW407	EP2106590	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	0.02	<1	189	<1
0089_PW409_210610	10/06/2021	PW409	EP2106590	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	113	<1
0089_PW411_210609	9/06/2021	PW411	EP2106519	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	115	<1
0089_PW413_210609	9/06/2021	PW413	EP2106519	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1
0089_PW415_210609	9/06/2021	PW415	EP2106519	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	125	<1

Notes:
First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value
*LOR value adopted for PFOS

				Inorganics											Metals		
				Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	pH (Lab)	Sodium (filtered)	Sulphate as SO4 - Turbidimetric (filtered)	TDS	TOC	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)
				mg/L	meq/L	meq/L	mg/L	%	pH Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting				1	0.01	0.01	1	0.01	0.01	1	1	10	1	5	1	1	1
PFAS NEMP 2020 Ecological 99% species protection																	
PFAS NEMP 2020 Drinking Water																	
PFAS NEMP 2020 Recreational Water																	
Field ID	Date	Location Code	Lab Report Number														
0089_PW304_210610	10/06/2021	PW304	EP2106582	657	344	321	10,700	3.34	7.64	5,140	1,380	19,800	152	1,850	268	916	357
0089_PW306_210609	9/06/2021	PW306	EP2106519	115	583	673	18,700	7.17	7.93	11,700	2,550	39,500	2	44	472	1,510	634
0089_PW307_210609	9/06/2021	PW307	EP2106519	114	578	689	18,500	8.80	8.00	12,000	2,580	38,200	2	83	482	1,540	651
0089_PW308_210609	9/06/2021	PW308	EP2106519	111	576	662	18,400	6.98	8.01	11,500	2,620	38,500	3	54	468	1,490	625
0089_PW314_210609	9/06/2021	PW314	EP2106519	109	583	657	18,700	5.90	7.92	11,400	2,580	36,000	1	20	463	1,480	619
0089_PW315_210609	9/06/2021	PW315	EP2106519	114	577	652	18,500	6.08	7.96	11,300	2,560	38,100	4	210	463	1,480	616
0089_PW316_210609	9/06/2021	PW316	EP2106519	118	575	673	18,400	7.84	8.00	11,700	2,580	38,500	<1	376	474	1,510	631
0089_PW329_210608	8/06/2021	PW329	EP2106465	146	546	634	17,300	7.45	7.69	11,000	2,640	40,900	40	522	466	1,420	595
0089_PW330_210608	8/06/2021	PW330	EP2106465	138	570	628	18,200	4.92	7.85	10,900	2,570	39,600	6	57	465	1,410	594
0089_PW331_210608	8/06/2021	PW331	EP2106465	110	591	622	18,900	2.59	7.83	10,800	2,660	43,000	5	102	446	1,400	584
0089_PW335_210608	8/06/2021	PW335	EP2106465	125	581	634	18,600	4.34	7.73	11,000	2,600	43,000	2	119	460	1,430	586
0089_PW340_210608	8/06/2021	PW340	EP2106450	111	543	648	17,200	8.80	7.70	11,300	2,670	38,900	4	92	449	1,440	598
0089_PW341_210608	8/06/2021	PW341	EP2106450	123	562	660	17,800	7.97	7.68	11,500	2,780	39,000	6	89	463	1,470	607
0089_PW345_210609	9/06/2021	PW345	EP2106517	145	569	656	18,200	7.13	7.74	11,400	2,540	39,000	68	1,720	470	1,480	604
0089_PW346_210610	10/06/2021	PW346	EP2106580	271	554	600	17,600	4.06	7.55	10,300	2,490	38,000	103	923	469	1,380	608
0089_PW350_210608	8/06/2021	PW350	EP2106450	114	567	670	18,000	8.31	7.83	11,700	2,730	42,700	<1	198	462	1,480	622
0089_PW351_210608	8/06/2021	PW351	EP2106450	105	568	660	18,000	7.48	7.96	11,500	2,790	42,200	<1	61	459	1,470	613
0089_PW352_210608	8/06/2021	PW352	EP2106450	116	568	676	18,000	8.70	8.01	11,800	2,770	41,400	1	26	469	1,500	620
0089_PW356_210608	8/06/2021	PW356	EP2106465	110	590	645	18,900	4.46	7.77	11,200	2,620	43,400	5	178	460	1,450	607
0089_PW357_210608	8/06/2021	PW357	EP2106465	142	590	657	18,900	5.37	7.79	11,400	2,600	44,200	<1	87	490	1,470	616
0089_PW358_210608	8/06/2021	PW358	EP2106465	125	595	682	19,000	6.86	7.66	11,800	2,700	44,300	8	38	492	1,550	660
0089_PW362_210608	8/06/2021	PW362	EP2106450	128	558	642	17,700	6.98	7.75	11,200	2,720	37,700	3	118	448	1,430	590
0089_PW363_210608	8/06/2021	PW363	EP2106450	120	563	654	17,800	7.51	7.64	11,400	2,810	39,100	4	60	461	1,460	602
0089_PW364_210608	8/06/2021	PW364	EP2106465	116	585	639	18,700	4.41	7.76	11,100	2,670	41,800	2	391	461	1,440	592
0089_PW367_210609	9/06/2021	PW367	EP2106517	176	574	675	18,300	8.12	7.71	11,700	2,600	33,000	54	2,120	488	1,530	630
0089_PW368_210610	10/06/2021	PW368	EP2106582	219	506	563	16,200	5.35	7.74	9,650	2,150	35,200	27	172	446	1,310	530
0089_PW369_210609	9/06/2021	PW369	EP2106517	130	581	692	18,600	8.70	7.82	12,000	2,600	40,200	9	112	491	1,570	645
0089_PW374_210610	10/06/2021	PW374	EP2106582	120	578	662	18,500	6.78	7.87	11,500	2,600	42,100	6	136	462	1,500	618
0089_PW375_210610	10/06/2021	PW375	EP2106582	118	581	691	18,600	8.63	7.89	12,000	2,610	42,800	3	64	485	1,560	649
0089_PW378_210610	10/06/2021	PW378	EP2106582	131	581	669	18,600	7.06	7.86	11,600	2,580	37,600	9	60	470	1,520	630
0089_PW380_210608	8/06/2021	PW380	EP2106450	120	588	657	18,800	5.57	7.65	11,400	2,640	42,300	1	88	466	1,480	630
0089_PW381_210608	8/06/2021	PW381	EP2106450	115	568	660	18,000	7.48	8.09	11,500	2,780	42,000	2	31	458	1,470	613
0089_PW401_210608	8/06/2021	PW401	EP2106450	116	573	653	18,200	6.51	8.04	11,400	2,760	42,800	2	152	450	1,450	598
0089_PW405_210610	10/06/2021	PW405	EP2106590	206	164	159	5,130	1.26	7.91	2,580	707	9,310	11	33	254	378	135
0089_PW407_210610	10/06/2021	PW407	EP2106590	189	537	611	17,200	6.46	7.99	10,600	2,310	42,700	14	326	445	1,370	597
0089_PW409_210610	10/06/2021	PW409	EP2106590	113	583	658	18,700	5.99	7.81	11,400	2,580	40,800	16	298	475	1,480	642
0089_PW411_210609	9/06/2021	PW411	EP2106519	115	587	674	18,800	6.88	7.87	11,700	2,630	33,300	3	66	479	1,520	633
0089_PW413_210609	9/06/2021	PW413	EP2106519	118	587	673	18,800	6.87	7.86	11,700	2,590	38,900	2	162	477	1,510	634
0089_PW415_210609	9/06/2021	PW415	EP2106519	125	579	703	18,500	9.64	7.88	12,200	2,630	37,400	2	172	499	1,580	666

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

*LOR value adopted for PFOS

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05
PFAS NEMP 2020 Ecological 99% species protection					LOR*													
PFAS NEMP 2020 Drinking Water											*0.56*							
PFAS NEMP 2020 Recreational Water											10							
Field ID	Date	Location Code	Lab Report Number															
0089_SW130_210608	8/06/2021	SW130	EP2106465	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW132_210608	8/06/2021	SW132	EP2106465	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW134_210608	8/06/2021	SW134	EP2106450	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW150_210608	8/06/2021	SW150	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW152_210608	8/06/2021	SW152	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW154_210608	8/06/2021	SW154	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW156_210608	8/06/2021	SW156	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW305_210610	10/06/2021	SW305	EP2106582	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW309_210609	9/06/2021	SW309	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW310_210609	9/06/2021	SW310	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW311_210609	9/06/2021	SW311	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW317_210610	10/06/2021	SW317	EP2106582	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW318_210610	10/06/2021	SW318	EP2106582	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW319_210610	10/06/2021	SW319	EP2106582	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW353_210608	8/06/2021	SW353	EP2106450	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW370_210609	9/06/2021	SW370	EP2106517	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW371_210610	10/06/2021	SW371	EP2106590	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW372_210610	10/06/2021	SW372	EP2106590	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_MW373_210610	10/06/2021	SW373	EP2106579	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW382_210608	8/06/2021	SW382	EP2106450	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW383_210608	8/06/2021	SW383	EP2106450	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW384_210608	8/06/2021	SW384	EP2106450	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW406_210610	10/06/2021	SW406	EP2106590	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW408_210610	10/06/2021	SW408	EP2106590	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW410_210610	10/06/2021	SW410	EP2106590	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW412_210609	9/06/2021	SW412	EP2106517	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW414_210609	9/06/2021	SW414	EP2106517	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05
0089_SW416_210609	9/06/2021	SW416	EP2106517	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

*LOR value adopted for PFOS

	- Fluorotelomer Sulfonic Acids			PFAS - Perfluoroalkyl Sulfonamides							PFAS							
	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Sum of PFAS	Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	meq/L
LOR - Limit of Reporting	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01	1	1	1	1	0.01
PFAS NEMP 2020 Ecological 99% species protection																		
PFAS NEMP 2020 Drinking Water												*0.07*						
PFAS NEMP 2020 Recreational Water												2						

Field ID	Date	Location Code	Lab Report Number																
0089_SW130_210608	8/06/2021	SW130	EP2106465	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05	<1	117	<1	117	592
0089_SW132_210608	8/06/2021	SW132	EP2106465	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	117	<1	117	588
0089_SW134_210608	8/06/2021	SW134	EP2106450	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	562
0089_SW150_210608	8/06/2021	SW150	EP2106465	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	597
0089_SW152_210608	8/06/2021	SW152	EP2106465	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	113	<1	113	589
0089_SW154_210608	8/06/2021	SW154	EP2106465	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	111	<1	111	588
0089_SW156_210608	8/06/2021	SW156	EP2106465	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	113	<1	113	567
0089_SW305_210610	10/06/2021	SW305	EP2106582	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	144	<1	144	581
0089_SW309_210609	9/06/2021	SW309	EP2106519	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	590
0089_SW310_210609	9/06/2021	SW310	EP2106519	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	115	<1	115	578
0089_SW311_210609	9/06/2021	SW311	EP2106519	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	113	<1	113	572
0089_SW317_210610	10/06/2021	SW317	EP2106582	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	113	<1	113	573
0089_SW318_210610	10/06/2021	SW318	EP2106582	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	581
0089_SW319_210610	10/06/2021	SW319	EP2106582	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	115	<1	115	581
0089_SW353_210608	8/06/2021	SW353	EP2106450	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	104	<1	104	565
0089_SW370_210609	9/06/2021	SW370	EP2106517	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	166	<1	166	580
0089_SW371_210610	10/06/2021	SW371	EP2106590	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	129	<1	129	566
0089_SW372_210610	10/06/2021	SW372	EP2106590	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	162	<1	162	566
0089_MW373_210610	10/06/2021	SW373	EP2106579	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	151	<1	151	576
0089_SW382_210608	8/06/2021	SW382	EP2106450	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	568
0089_SW383_210608	8/06/2021	SW383	EP2106450	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	568
0089_SW384_210608	8/06/2021	SW384	EP2106450	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	113	<1	113	562
0089_SW406_210610	10/06/2021	SW406	EP2106590	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	112	<1	112	584
0089_SW408_210610	10/06/2021	SW408	EP2106590	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	135	<1	135	578
0089_SW410_210610	10/06/2021	SW410	EP2106590	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	110	<1	110	579
0089_SW412_210609	9/06/2021	SW412	EP2106517	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	584
0089_SW414_210609	9/06/2021	SW414	EP2106517	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	583
0089_SW416_210609	9/06/2021	SW416	EP2106517	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	568

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

*LOR value adopted for PFOS

				Inorganics										Metals		
				Cations Total	Chloride	Ionic Balance	pH (Lab)	Sodium (filtered)	Sulphate as SO4 - Turbidimetric (filtered)	TDS	TOC	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)
				meq/L	mg/L	%	pH Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting				0.01	1	0.01	0.01	1	1	10	1	5	1	1	1
PFAS NEMP 2020 Ecological 99% species protection															
PFAS NEMP 2020 Drinking Water															
PFAS NEMP 2020 Recreational Water															
Field ID	Date	Location Code	Lab Report Number												
0089_SW130_210608	8/06/2021	SW130	EP2106465	650	18,900	4.68	7.81	11,300	2,720	43,600	10	1,060	464	1,460	606
0089_SW132_210608	8/06/2021	SW132	EP2106465	618	18,800	2.51	7.87	10,700	2,660	37,800	5	1,160	441	1,410	580
0089_SW134_210608	8/06/2021	SW134	EP2106450	676	17,800	9.18	7.81	11,800	2,780	37,000	4	467	467	1,500	626
0089_SW150_210608	8/06/2021	SW150	EP2106465	621	19,100	1.98	8.11	10,800	2,670	42,400	1	73	438	1,390	578
0089_SW152_210608	8/06/2021	SW152	EP2106465	650	18,800	4.97	8.10	11,300	2,700	38,400	2	92	463	1,460	611
0089_SW154_210608	8/06/2021	SW154	EP2106465	651	18,800	5.16	8.09	11,300	2,640	43,000	<1	50	465	1,470	614
0089_SW156_210608	8/06/2021	SW156	EP2106465	656	18,000	7.24	7.94	11,400	2,750	40,800	1	12	463	1,470	618
0089_SW305_210610	10/06/2021	SW305	EP2106582	658	18,600	6.20	7.67	11,400	2,580	41,900	53	1,530	463	1,500	615
0089_SW309_210609	9/06/2021	SW309	EP2106519	668	18,900	6.15	8.09	11,600	2,630	39,000	1	26	470	1,500	630
0089_SW310_210609	9/06/2021	SW310	EP2106519	657	18,500	6.40	8.08	11,400	2,570	37,600	2	19	466	1,480	618
0089_SW311_210609	9/06/2021	SW311	EP2106519	668	18,300	7.70	8.12	11,600	2,590	35,400	<1	20	474	1,500	632
0089_SW317_210610	10/06/2021	SW317	EP2106582	662	18,300	7.26	8.12	11,500	2,610	42,700	2	14	461	1,500	621
0089_SW318_210610	10/06/2021	SW318	EP2106582	668	18,600	6.97	8.05	11,600	2,600	42,800	3	20	467	1,510	628
0089_SW319_210610	10/06/2021	SW319	EP2106582	669	18,600	7.03	8.03	11,600	2,600	41,900	2	18	468	1,520	626
0089_SW353_210608	8/06/2021	SW353	EP2106450	665	17,900	8.10	8.08	11,600	2,800	39,400	<1	18	458	1,480	618
0089_SW370_210609	9/06/2021	SW370	EP2106517	670	18,500	7.19	7.67	11,600	2,620	39,100	86	2,430	480	1,520	624
0089_SW371_210610	10/06/2021	SW371	EP2106590	647	18,000	6.70	7.63	11,200	2,670	40,300	41	821	472	1,460	636
0089_SW372_210610	10/06/2021	SW372	EP2106590	677	18,100	8.95	7.69	11,700	2,490	42,300	21	765	496	1,530	675
0089_MW373_210610	10/06/2021	SW373	EP2106579	676	18,400	7.97	7.64	11,700	2,600	39,200	12	325	486	1,540	629
0089_SW382_210608	8/06/2021	SW382	EP2106450	669	18,000	8.15	8.09	11,700	2,810	40,400	<1	20	458	1,480	619
0089_SW383_210608	8/06/2021	SW383	EP2106450	672	18,000	8.31	8.11	11,700	2,810	40,900	1	39	468	1,500	623
0089_SW384_210608	8/06/2021	SW384	EP2106450	654	17,800	7.58	8.09	11,400	2,770	40,200	<1	24	454	1,460	608
0089_SW406_210610	10/06/2021	SW406	EP2106590	692	18,600	8.50	7.94	12,000	2,740	42,400	7	69	494	1,560	680
0089_SW408_210610	10/06/2021	SW408	EP2106590	652	18,500	6.04	7.85	11,300	2,560	39,500	5	726	468	1,470	638
0089_SW410_210610	10/06/2021	SW410	EP2106590	675	18,500	7.71	7.91	11,700	2,620	38,700	3	80	488	1,520	660
0089_SW412_210609	9/06/2021	SW412	EP2106517	714	18,600	9.97	8.11	12,500	2,760	41,700	<1	6	482	1,590	600
0089_SW414_210609	9/06/2021	SW414	EP2106517	710	18,700	9.81	8.10	12,300	2,580	28,200	<1	23	503	1,620	665
0089_SW416_210609	9/06/2021	SW416	EP2106517	692	18,200	9.87	8.05	12,000	2,500	38,400	<1	64	492	1,570	645

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

*LOR value adopted for PFOS

				PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting				0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure								*1*						*10*						
PFAS NEMP 2020 Ecological indirect exposure								0.01												
PFAS NEMP 2020 Industrial/ commercial (HIL D)														50						
Field ID	Date	Location Code	Lab Report No.																	
0089_SD304_210610	10/06/2021	SD304	EP2106581	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD306_210609	9/06/2021	SD306	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD307_210609	9/06/2021	SD307	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD308_210609	9/06/2021	SD308	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD314_210609	9/06/2021	SD314	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD315_210609	9/06/2021	SD315	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD316_210609	9/06/2021	SD316	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD329_210608	8/06/2021	SD329	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD330_210608	8/06/2021	SD330	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD331_210608	8/06/2021	SD331	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD335_210608	8/06/2021	SD335	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD340_210608	8/06/2021	SD340	EP2106449	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD341_210608	8/06/2021	SD341	EP2106449	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD345_210609	9/06/2021	SD345	EP2106518	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD346_210610	10/06/2021	SD346	EP2106581	<0.0002	<0.0002	<0.0002	<0.0002	0.0028	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD350_210608	8/06/2021	SD350	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD351_210608	8/06/2021	SD351	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD352_210608	8/06/2021	SD352	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD356_210608	8/06/2021	SD356	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD357_210608	8/06/2021	SD357	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD358_210608	8/06/2021	SD358	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD362_210608	8/06/2021	SD362	EP2106449	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD363_210608	8/06/2021	SD363	EP2106449	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD364_210608	8/06/2021	SD364	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD367_210609	9/06/2021	SD367	EP2106518	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD368_210610	10/06/2021	SD368	EP2106581	<0.0002	<0.0002	<0.0002	<0.0002	0.0010	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD369_210609	9/06/2021	SD369	EP2106518	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD374_210610	10/06/2021	SD374	EP2106581	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD375_210610	10/06/2021	SD375	EP2106581	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD378_210610	10/06/2021	SD378	EP2106581	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD380_210608	8/06/2021	SD380	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD381_210608	8/06/2021	SD381	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD401_210608	8/06/2021	SD401	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD405_210610	10/06/2021	SD405	EP2106589	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD407_210610	10/06/2021	SD407	EP2106589	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD409_210610	10/06/2021	SD409	EP2106589	<0.0002	<0.0002	<0.0002	<0.0002	0.0011	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD411_210609	9/06/2021	SD411	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD413_210609	9/06/2021	SD413	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
0089_SD415_210609	9/06/2021	SD415	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

				PFAS - Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
				4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Sum of PFAS
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting				0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure																	
PFAS NEMP 2020 Ecological indirect exposure																	
PFAS NEMP 2020 Industrial/ commercial (HIL D)																20	
Field ID	Date	Location Code	Lab Report No.														
0089_SD304_210610	10/06/2021	SD304	EP2106581	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006	0.0006
0089_SD306_210609	9/06/2021	SD306	EP2106520	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD307_210609	9/06/2021	SD307	EP2106520	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD308_210609	9/06/2021	SD308	EP2106520	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD314_210609	9/06/2021	SD314	EP2106520	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD315_210609	9/06/2021	SD315	EP2106520	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD316_210609	9/06/2021	SD316	EP2106520	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD329_210608	8/06/2021	SD329	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD330_210608	8/06/2021	SD330	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD331_210608	8/06/2021	SD331	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD335_210608	8/06/2021	SD335	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD340_210608	8/06/2021	SD340	EP2106449	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD341_210608	8/06/2021	SD341	EP2106449	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD345_210609	9/06/2021	SD345	EP2106518	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
0089_SD346_210610	10/06/2021	SD346	EP2106581	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0028	0.0028	0.0028
0089_SD350_210608	8/06/2021	SD350	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
0089_SD351_210608	8/06/2021	SD351	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
0089_SD352_210608	8/06/2021	SD352	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD356_210608	8/06/2021	SD356	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD357_210608	8/06/2021	SD357	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD358_210608	8/06/2021	SD358	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD362_210608	8/06/2021	SD362	EP2106449	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD363_210608	8/06/2021	SD363	EP2106449	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD364_210608	8/06/2021	SD364	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD367_210609	9/06/2021	SD367	EP2106518	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
0089_SD368_210610	10/06/2021	SD368	EP2106581	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0010	0.0010	0.0010
0089_SD369_210609	9/06/2021	SD369	EP2106518	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
0089_SD374_210610	10/06/2021	SD374	EP2106581	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
0089_SD375_210610	10/06/2021	SD375	EP2106581	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
0089_SD378_210610	10/06/2021	SD378	EP2106581	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
0089_SD380_210608	8/06/2021	SD380	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
0089_SD381_210608	8/06/2021	SD381	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD401_210608	8/06/2021	SD401	EP2106466	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
0089_SD405_210610	10/06/2021	SD405	EP2106589	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
0089_SD407_210610	10/06/2021	SD407	EP2106589	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD409_210610	10/06/2021	SD409	EP2106589	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0011	0.0011	0.0011
0089_SD411_210609	9/06/2021	SD411	EP2106520	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD413_210609	9/06/2021	SD413	EP2106520	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0089_SD415_210609	9/06/2021	SD415	EP2106520	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

				Inorganics									Organic
				Exchangeable Sodium Percent	Moisture Content	Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	CEC	Electrical conductivity *(lab)	pH (Lab)	Organic Matter
				%	%	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	µS/cm	pH Units	%
LOR - Limit of Reporting				0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	0.5
PFAS NEMP 2020 Ecological direct exposure													
PFAS NEMP 2020 Ecological indirect exposure													
PFAS NEMP 2020 Industrial/ commercial (HIL D)													
Field ID	Date	Location Code	Lab Report No.										
0089_SD304_210610	10/06/2021	SD304	EP2106581	2.9	25.4	2.9	0.4	<0.1	<0.1	3.4	3,310	8.9	1.0
0089_SD306_210609	9/06/2021	SD306	EP2106520	1.5	21.2	10.2	1.0	<0.1	0.2	11.4	26,000	9.3	<0.5
0089_SD307_210609	9/06/2021	SD307	EP2106520	3.2	9.4	2.9	0.3	<0.1	0.1	3.4	1,230	9.6	<0.5
0089_SD308_210609	9/06/2021	SD308	EP2106520	5.3	5.2	2.1	0.3	<0.1	0.1	2.5	985	9.7	1.1
0089_SD314_210609	9/06/2021	SD314	EP2106520	3.6	10.0	2.9	0.3	<0.1	0.1	3.4	1,160	9.6	<0.5
0089_SD315_210609	9/06/2021	SD315	EP2106520	3.5	5.0	2.6	0.3	<0.1	0.1	3.0	818	9.7	<0.5
0089_SD316_210609	9/06/2021	SD316	EP2106520	4.0	5.3	2.3	0.3	<0.1	0.1	2.7	1,110	9.6	<0.5
0089_SD329_210608	8/06/2021	SD329	EP2106466	2.3	22.2	4.8	0.5	<0.1	0.1	5.4	31,100	9.3	0.7
0089_SD330_210608	8/06/2021	SD330	EP2106466	2.5	19.1	5.1	0.6	<0.1	0.1	5.8	27,700	9.2	0.8
0089_SD331_210608	8/06/2021	SD331	EP2106466	3.1	22.0	2.9	0.3	<0.1	0.1	3.3	24,200	9.2	1.2
0089_SD335_210608	8/06/2021	SD335	EP2106466	2.0	23.3	5.4	0.5	<0.1	0.1	6.0	34,100	9.1	0.8
0089_SD340_210608	8/06/2021	SD340	EP2106449	2.3	26.5	4.0	0.5	<0.1	0.1	4.6	36,600	9.1	1.2
0089_SD341_210608	8/06/2021	SD341	EP2106449	2.1	27.0	5.6	0.6	<0.1	0.1	6.3	1,440	9.3	1.0
0089_SD345_210609	9/06/2021	SD345	EP2106518	12.8	10.3	3.8	0.6	<0.1	0.6	5.1	186	9.6	1.1
0089_SD346_210610	10/06/2021	SD346	EP2106581	3.3	25.7	9.1	0.7	<0.1	0.3	10.2	114	8.5	2.3
0089_SD350_210608	8/06/2021	SD350	EP2106466	3.3	11.2	4.8	0.5	<0.1	0.2	5.5	1,810	9.4	0.6
0089_SD351_210608	8/06/2021	SD351	EP2106466	3.2	16.5	4.7	0.5	<0.1	0.2	5.4	29,200	9.2	<0.5
0089_SD352_210608	8/06/2021	SD352	EP2106466	1.9	15.2	10.3	0.9	<0.1	0.2	11.4	24,400	9.3	<0.5
0089_SD356_210608	8/06/2021	SD356	EP2106466	1.7	21.4	10.0	0.9	<0.1	0.2	11.0	33,500	9.1	1.2
0089_SD357_210608	8/06/2021	SD357	EP2106466	2.4	31.7	3.4	0.4	<0.1	<0.1	3.8	41,800	9.0	1.2
0089_SD358_210608	8/06/2021	SD358	EP2106466	2.3	22.6	3.5	0.4	<0.1	<0.1	4.0	32,400	9.3	1.0
0089_SD362_210608	8/06/2021	SD362	EP2106449	2.2	28.9	4.0	0.4	<0.1	0.1	4.6	30,600	9.1	0.6
0089_SD363_210608	8/06/2021	SD363	EP2106449	2.1	24.2	5.2	0.6	<0.1	0.1	6.0	35,400	9.0	0.6
0089_SD364_210608	8/06/2021	SD364	EP2106466	2.3	25.7	4.9	0.5	<0.1	0.1	5.6	33,700	9.0	1.0
0089_SD367_210609	9/06/2021	SD367	EP2106518	0.6	10.6	9.0	0.7	<0.1	<0.1	9.8	58	9.5	0.9
0089_SD368_210610	10/06/2021	SD368	EP2106581	2.4	26.2	4.5	0.5	<0.1	0.1	5.2	3,200	8.9	1.1
0089_SD369_210609	9/06/2021	SD369	EP2106518	1.0	9.8	4.9	0.5	<0.1	<0.1	5.5	50	9.6	0.9
0089_SD374_210610	10/06/2021	SD374	EP2106581	1.5	20.6	11.8	1.1	<0.1	0.2	13.1	2,800	9.1	<0.5
0089_SD375_210610	10/06/2021	SD375	EP2106581	2.7	18.4	4.9	0.5	<0.1	0.2	5.6	2,700	9.2	0.5
0089_SD378_210610	10/06/2021	SD378	EP2106581	2.7	22.8	4.0	0.4	<0.1	0.1	4.6	3,130	9.1	0.9
0089_SD380_210608	8/06/2021	SD380	EP2106466	3.0	20.5	5.2	0.6	<0.1	0.2	6.0	28,600	9.3	0.8
0089_SD381_210608	8/06/2021	SD381	EP2106466	3.1	14.4	4.8	0.5	<0.1	0.2	5.4	1,800	9.3	<0.5
0089_SD401_210608	8/06/2021	SD401	EP2106466	3.2	17.6	4.8	0.5	<0.1	0.2	5.5	24,600	9.3	<0.5
0089_SD405_210610	10/06/2021	SD405	EP2106589	1.9	18.1	3.4	0.3	<0.1	<0.1	3.8	528	9.3	0.8
0089_SD407_210610	10/06/2021	SD407	EP2106589	2.0	31.2	5.9	0.7	<0.1	0.1	6.7	3,720	9.1	1.2
0089_SD409_210610	10/06/2021	SD409	EP2106589	39.4	26.4	11.0	3.5	0.3	9.6	24.4	3,630	8.9	1.2
0089_SD411_210609	9/06/2021	SD411	EP2106520	3.3	22.2	4.3	0.5	<0.1	0.2	5.0	31,100	9.2	0.7
0089_SD413_210609	9/06/2021	SD413	EP2106520	2.0	18.3	9.2	0.8	<0.1	0.2	10.2	2,080	9.2	1.0
0089_SD415_210609	9/06/2021	SD415	EP2106520	3.6	20.4	5.2	0.6	<0.1	0.2	6.1	25,900	9.3	0.9

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - Fluorotelor	
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecano ic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05	0.05
PFAS NEMP 2020 Ecological 99% species protection					LOR														
PFAS NEMP 2020 Drinking Water											*0.56*								
PFAS NEMP 2020 Recreational Water											10								

Field ID	Date	Lab Report Number																		
0089_QC301_210608	8/06/2021	EP2106464	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC301_210609	9/06/2021	EP2106516	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC301_210610	10/06/2021	EP2106588	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC302_210608	8/06/2021	EP2106464	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC302_210609	9/06/2021	EP2106516	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC302_210610	10/06/2021	EP2106588	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC303_210609	9/06/2021	EP2106516	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.10	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC303_210610	10/06/2021	EP2106588	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC401_210608	8/06/2021	EP2106464	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC401_210609	9/06/2021	EP2106516	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC401_210610	10/06/2021	EP2106588	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC402_210608	8/06/2021	EP2106464	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC402_210609	9/06/2021	EP2106516	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.10	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC402_210610	10/06/2021	EP2106588	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC403_210609	9/06/2021	EP2106516	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.10	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05
0089_QC403_210610	10/06/2021	EP2106588	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05

	her Sulfonic Acids		PFAS - Perfluoroalkyl Sulfonamides							PFAS		
	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Sum of PFAS
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01
PFAS NEMP 2020 Ecological 99% species protection												
PFAS NEMP 2020 Drinking Water											*0.07*	
PFAS NEMP 2020 Recreational Water											2	
Field ID	Date	Lab Report Number										
0089_QC301_210608	8/06/2021	EP2106464	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC301_210609	9/06/2021	EP2106516	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC301_210610	10/06/2021	EP2106588	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC302_210608	8/06/2021	EP2106464	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC302_210609	9/06/2021	EP2106516	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC302_210610	10/06/2021	EP2106588	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC303_210609	9/06/2021	EP2106516	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC303_210610	10/06/2021	EP2106588	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC401_210608	8/06/2021	EP2106464	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC401_210609	9/06/2021	EP2106516	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC401_210610	10/06/2021	EP2106588	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC402_210608	8/06/2021	EP2106464	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC402_210609	9/06/2021	EP2106516	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC402_210610	10/06/2021	EP2106588	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC403_210609	9/06/2021	EP2106516	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
0089_QC403_210610	10/06/2021	EP2106588	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01

						0089_SD329_210608	0089_QC104_210608		0089_SD329_210608	0089_QC204_210608		0089_SD358_210608	0089_QC108_210608		0089_SD358_210608	0089_QC208_210608		0089_SD405_210610	0089_QC116_210610	
						8/06/2021	8/06/2021		8/06/2021	8/06/2021		8/06/2021	8/06/2021		8/06/2021	8/06/2021		10/06/2021	10/06/2021	
			Ecological	Ecological	Human Health	Soil	Soil		Soil	Soil		Soil	Soil		Soil	Soil		Soil	Soil	
	Unit	LOR	Direct exposure	Indirect Exposure	Commercial/Industrial	EP2106466	EP2106466	RPD	EP2106466	802464	RPD	EP2106466	EP2106466	RPD	EP2106466	802464	RPD	EP2106589	EP2106589	RPD
PFAS - Perfluoroalkyl Sulfonic Acids																				
Perfluoropropanesulfonic acid (PFPrS)	mg/kg	0.005								<0.005						<0.005				
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	1.00	0.01		<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	0.0003	0.0006	67
Perfluorononanesulfonic acid (PFNS)	mg/kg	0.005								<0.005						<0.005				
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
PFAS - Perfluoroalkyl Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	mg/kg	0.001				<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	10.00		50.00	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005				<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
PFAS - Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005				<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005				<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005				<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005				<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0
PFAS - Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005				<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005				<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005				<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005				<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0
PFAS																				
Sum of PFAS (WA DER List)	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	0.0003	0.0006	67
Sum of PFHxS and PFOS	mg/kg	0.0002			20.00	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	0.0003	0.0006	67
Sum of PFAS	mg/kg	0.0002				<0.0002	<0.0002	0	<0.0002	<0.05	0	<0.0002	<0.0002	0	<0.0002	<0.05	0	0.0003	0.0006	67
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	mg/kg	0.005								<0.005						<0.005				
Organic																				
Organic Matter	%	0.5				0.7	0.6	15	0.7			1.0	0.9	11	1.0			0.8	0.5	46

*RPDs have only been considered where a concentration is greater than 1 times the LOR.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

						0089_SD405_210610	0089_QC216_210610		0089_SD378_210610	0089_QC117_210610		0089_SD378_210610	0089_QC217_210610	
						10/06/2021	10/06/2021		10/06/2021	10/06/2021		10/06/2021	10/06/2021	
			Ecological	Ecological	Human Health	Soil	Soil		Soil	Soil		Soil	Soil	
			Direct exposure	Indirect Exposure	Commercial/Industrial	EP2106589	802734	RPD	EP2106581	EP2106581	RPD	EP2106581	802734	RPD
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluoropropanesulfonic acid (PFPrS)	mg/kg	0.005					<0.005						<0.005	
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	1.00	0.01		0.0003	<0.005	0	0.0004	0.0003	29	0.0004	<0.005	0
Perfluorononanesulfonic acid (PFNS)	mg/kg	0.005					<0.005						<0.005	
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	mg/kg	0.001				<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	10.00		50.00	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005				<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
PFAS - Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005				<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005				<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005				<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005				<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002				<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005				<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002				<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005				<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005				<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002				<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005				<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS														
Sum of PFAS (WA DER List)	mg/kg	0.0002				0.0003	<0.01	0	0.0004	0.0003	29	0.0004	<0.01	0
Sum of PFHxS and PFOS	mg/kg	0.0002			20.00	0.0003	<0.005	0	0.0004	0.0003	29	0.0004	<0.005	0
Sum of PFAS	mg/kg	0.0002				0.0003	<0.05	0	0.0004	0.0003	29	0.0004	<0.05	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	mg/kg	0.005					<0.005						<0.005	
Organic														
Organic Matter	%	0.5				0.8			0.9	1.1	20	0.9		

*RPDs have only been considered where a concentration is greater than 1 times the LOR.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (1
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate t

Field ID						0089_MW139_210608	0089_QC101_210608		0089_MW139_210608	0089_QC201_210608		0089_MW123_210608	0089_QC102_210608		0089_MW123_210608	0089_QC202_210608		0089_PW329_210608	0089_QC103_210608		0089_PW329_210608	0089_QC203_210608	
Date						8/06/2021	8/06/2021		8/06/2021	8/06/2021		8/06/2021	8/06/2021		8/06/2021	8/06/2021		8/06/2021	8/06/2021		8/06/2021	8/06/2021	
Matrix Type			Human Health	Human Health	Ecological 99% Species protection	Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water	
Lab Report Number	Unit	LOR	Drinking water	Recreational water		EP2106464	EP2106464	RPD	EP2106464	802464	RPD	EP2106448	EP2106448	RPD	EP2106448	802464	RPD	EP2106465	EP2106465	RPD	EP2106465	802464	RPD
PFAS - Perfluoroalkyl Sulfonic Acids																							
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01								<0.01						0.04						<0.01	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	0.16	0.16	0	0.16	0.14	13	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	0.13	0.14	7	0.13	0.15	14	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	0.68	0.60	13	0.68	0.60	13	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01			LOR	<0.01	<0.01	0	<0.01	<0.01	0	0.07	0.05	33	0.07	0.04	55	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01								<0.01						<0.01						<0.01	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids																							
Perfluorobutanoic acid (PFBA)	µg/L	0.05				<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	0.08	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	0.62	0.54	14	0.62	0.47	28	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	0.14	0.13	7	0.14	0.12	15	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	0.02	<0.02	0	0.02	0.02	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.56	10.00	19.00	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Fluorotelomer Sulfonic Acids																							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05				<0.05	0.06	18	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides																							
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS																							
Sum of PFAS (WA DER List)	µg/L	0.01				<0.01	0.06	143	<0.01	<0.05	0	1.69	1.48	13	1.69	1.47	14	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFHxS and PFOS	µg/L	0.01	0.07	2.00		<0.01	<0.01	0	<0.01	<0.01	0	0.75	0.65	14	0.75	0.64	16	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFAS	µg/L	0.01				<0.01	0.06	143	<0.01	<0.1	0	1.82	1.62	12	1.82	1.66	9	<0.01	<0.01	0	<0.01	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01								<0.01						0.64						<0.01	
Metals																							
Caloium	mg/L	0.5								130						66						580	
Calcium (filtered)	mg/L	0.5				106	102	4	106			94	98	4	94			466	473	1	466		
Magnesium	mg/L	0.5							130							18						1,500	
Magnesium (filtered)	mg/L	0.5				80	87	8	80			17	19	11	17			1,420	1,430	1	1,420		
Potassium	mg/L	0.5								36						2.2						500	
Potassium (filtered)	mg/L	0.5				25	29	15	25			3	3	0	3			595	593	0	595		

*RPDs have only been considered where a concentration is greater than 1 times the LOR.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table 7 Water RPDs Results

PFAS OMP Q2 2021 sampling event
HMAS Stirling

Field ID					0089_MW149_210608	0089_QC105_210608			0089_MW149_210608	0089_QC205_210608		0089_PW358_210608	0089_QC107_210608		0089_PW358_210608	0089_QC207_210608		0089_MW117_210608	0089_QC106_210608		0089_MW117_210608	0089_QC206_210608		0089_SW150_210608	0089_QC109_210608		0089_SW150_210608	0089_QC209_210608	
Date					8/06/2021	8/06/2021			8/06/2021	8/06/2021		8/06/2021	8/06/2021		8/06/2021	8/06/2021		8/06/2021	8/06/2021		8/06/2021	8/06/2021		8/06/2021	8/06/2021		8/06/2021	8/06/2021	
Matrix Type		Human Health	Human Health	Ecological 99% Species	Water	Water			Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water	
Lab Report Number		Drinking water	Recreational water	protection	EP2106464	EP2106464	RPD		EP2106464	802464	RPD	EP2106465	EP2106465	RPD	EP2106465	802464	RPD	EP2106448	EP2106448	RPD	EP2106448	802464	RPD	EP2106465	EP2106465	RPD	EP2106465	802464	RPD
	Unit	LOR																											
PFAS - Perfluoroalkyl Sulfonic Acids																													
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01								<0.01						<0.01						0.16						<0.01	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	0.46	<0.02	183	0.46	0.39	16	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	0.99	0.02	192	0.99	0.73	30	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	18.6	0.52	189	18.6	16	15	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	2.22	0.09	184	2.22	1.5	39	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01			LOR	<0.01	0		<0.01	<0.01	0	<0.01	<0.01	0	<0.01	0.02	67	47.3	4.95	162	47.3	55	15	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01								<0.01						<0.01						<0.02						<0.01	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids																													
Perfluorobutanoic acid (PFBA)	µg/L	0.05			<0.1	<0.1	0		<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	0.3	<0.1	100	0.3	0.25	18	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	3.96	0.08	192	3.96	2.6	41	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	0.68	<0.02	189	0.68	0.69	1	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	0.27	<0.02	172	0.27	0.29	7	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.56	10.00	19.00	<0.01	0		<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	1.02	0.04	185	1.02	1.1	8	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	0.02	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Fluorotelomer Sulfonic Acids																													
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	0.06	<0.05	18	0.06	0.08	29	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides																													
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS																													
Sum of PFAS (WA DER List)	µg/L	0.01				<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0	72.6	5.59	171	72.6	76.4	5	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFHxS and PFOS	µg/L	0.01	0.07	2.00		<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	0.02	67	65.9	5.47	169	65.9	71	7	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFAS	µg/L	0.01				<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0	75.9	5.70	172	75.9	78.81	4	<0.01	<0.01	0	<0.01	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFDA)	µg/L	0.01								<0.01						0.02						72.1						<0.01	
Metals																													
Calcium	mg/L	0.5								450						560						99						640	
Calcium (filtered)	mg/L	0.5				386	481	22	386			492	498	1	492			150	150	0	150			438	454	4	438		
Magnesium	mg/L	0.5								1,100						1,400						18						1,800	
Magnesium (filtered)	mg/L	0.5				1,080	1,380	24	1,080			1,550	1,510	3	1,550			18	18	0	18			1,390	1,440	4	1,390		
Potassium	mg/L	0.5								390						470						3.3						560	
Potassium (filtered)	mg/L	0.5				504	519	3	504			660	638	3	660			4	4	0	4			578	601	4	578		

*RPDs have only been considered where a concentration is greater than 1 times the LOR.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those usad in the primary laboratory

Table 7 Water RPDs Results

PFAS OMP Q2 2021 sampling event
HMAS Stirling

	Field ID				0089_SW134_210608	0089_QC110_210608			0089_SW134_210608	0089_QC210_210608		0089_MW518_210609	0089_QC111_210609		0089_MW518_210609	0089_QC211_210609		0089_MW195D_210609	0089_QC112_210609		0089_MW195D_210609	0089_QC212_210609		0089_MW256_210610	0089_QC113_210610		0089_MW256_210610	0089_QC213_210610	
	Date				8/06/2021	8/06/2021			8/06/2021	8/06/2021		9/06/2021	9/06/2021		9/06/2021	9/06/2021		9/06/2021	9/06/2021		9/06/2021	8/06/2021		10/06/2021	10/06/2021		10/06/2021	10/06/2021	
	Matrix Type	Human Health	Human Health	Ecological 99% Species	Water	Water			Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water	
	Lab Report Number	Drinking water	Recreational water	protection	EP2106450	EP2106450	RPD		EP2106450	802464	RPD	EP2106515	EP2106515	RPD	EP2106515	802464	RPD	EP2106514	EP2106514	RPD	EP2106514	802464	RPD	EP2106579	EP2106579	RPD	EP2106579	802734	RPD
	Unit	LOR																												
PFAS - Perfluoroalkyl Sulfonic Acids																														
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01								<0.01						0.01						<0.01						0.98	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	0.02	0	<0.02	0.02	0	<0.02	<0.02	0	<0.02	<0.01	0	1.28	1.40	9	1.28	1.8	34
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	3.05	2.68	13	3.05	3.0	2
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	0.02	0.02	0	0.02	0.02	0	<0.02	<0.02	0	<0.02	<0.01	0	38.8	34.4	12	38.8	27	36
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	2.11	1.88	12	2.11	2.4	13
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01			<0.01	<0.01	0	LOR	<0.01	0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	0.02	0.02	0	<0.01	<0.01	67	36.2	30.6	17	36.2	29	22
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01								<0.01						<0.01						<0.01						<0.01	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids																														
Perfluorobutanoic acid (PFBA)	µg/L	0.05			<0.1	<0.1	0		<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	0.3	0.3	0	0.3	0.41	31
Perfluorohexanoic acid (PFHxA)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	0.08	0.11	32	0.08	0.09	12	3.96	4.21	6	3.96	3.9	2
Perfluoropentanoic acid (PFPeA)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	0.10	0.14	33	0.10	0.11	10	0.67	0.70	4	0.67	0.67	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01			<0.02	<0.02	0		<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	0.05	0.07	33	0.05	0.05	0	0.70	0.76	8	0.70	0.77	10
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.56	10.00	19.00	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	2.34	2.45	5	2.34	2.3	2
Perfluorodecanoic acid (PFDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	0.10	0.10	0	0.10	0.11	10
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01				<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Fluorotelomer Sulfonic Acids																														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	2.05	2.52	21	2.05	1.2	52	0.14	0.13	7	0.14	0.07	67
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01				<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides																														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	0.08	0.07	13	0.08	0.19	81
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02				<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05				<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS																														
Sum of PFAS (WA DER List)	µg/L	0.01				<0.01	<0.01	0	<0.01	<0.05	0	0.02	0.04	67	0.02	<0.05	0	2.30	2.86	22	2.30	1.45	45	84.4	75.0	12	84.4	65.92	25
Sum of PFHxS and PFOS	µg/L	0.01	0.07	2.00		<0.01	<0.01	0	<0.01	0.01	0	0.02	0.02	0	0.02	0.02	0	0.02	0.02	0	0.02	<0.01	67	75.0	65.0	14	75.0	56	29
Sum of PFAS	µg/L	0.01				<0.01	<0.01	0	<0.01	<0.1	0	0.02	0.04	67	0.02	<0.1	0	2.30	2.86	22	2.30	1.45	45	89.7	79.7	12	89.7	72.6	21
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01								0.01						0.02						<0.01						58.3	
Metals																														
Calcium	mg/L	0.5								600						68						420						110	
Calcium (filtered)	mg/L	0.5			467	462	1		467			112	120	7	112			365	371	2	365			150	153	2	150		
Magnesium	mg/L	0.5								1,700						56						780						26	
Magnesium (filtered)	mg/L	0.5			1,500	1,490	1		1,500			59	65	10	59			719	731	2	719			41	41	0	41		
Potassium	mg/L	0.5								550						15						230						2.1	
Potassium (filtered)	mg/L	0.5			626	626	0		626			17	19	11	17			253	260	3	253			3	3	0	3		

*RPDs have only been considered where a concentration is greater than 1 times the LOR.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those usad in the primary laboratory

		Field ID		Human Health	Human Health	Ecological 99% Species protection	0089_SW410_210610	0089_QC114_210610		0089_SW410_210610	0089_QC214_210610		0089_PW405_210610	0089_QC115_210610		0089_PW405_210610	0089_QC215_210610		0089_PW375_210610	0089_QC118_210610		0089_PW375_210610	0089_QC218_210610	
		Date					10/06/2021	10/06/2021		10/06/2021	10/06/2021		10/06/2021	10/06/2021		10/06/2021	10/06/2021		10/06/2021	10/06/2021		10/06/2021	10/06/2021	
		Matrix Type					Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water	
		Lab Report Number		Drinking water	Recreational water		EP2106590	EP2106590	RPD	EP2106590	802734	RPD	EP2106590	EP2106590	RPD	EP2106590	802734	RPD	EP2106582	EP2106582	RPD	EP2106582	802734	RPD
	Unit	LOR																						
PFAS - Perfluoroalkyl Sulfonic Acids																								
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01									<0.01						<0.01						<0.01	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	0.03	<0.02	40	0.03	<0.01	100	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01				LOR	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	0.02	0.06	100	0.02	<0.01	67
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01									<0.01						<0.01						<0.01	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids																								
Perfluorobutanoic acid (PFBA)	µg/L	0.05					<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	0.06	0.07	15	0.06	0.06	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	0.05	0.05	0	0.05	0.05	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.56	10.00	19.00		<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01					<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01					<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Fluorotelomer Sulfonic Acids																								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01					<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05					<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01					<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01					<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides																								
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02					<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05					<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02					<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05					<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05					<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02					<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05					<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS																								
Sum of PFAS (WA DER List)	µg/L	0.01					<0.01	<0.01	0	<0.01	<0.05	0	0.11	0.12	9	0.11	0.11	0	0.02	0.06	100	0.02	<0.05	0
Sum of PFHxS and PFOS	µg/L	0.01	0.07	2.00			<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	0.02	0.06	100	0.02	<0.01	67
Sum of PFAS	µg/L	0.01					<0.01	<0.01	0	<0.01	<0.1	0	0.14	0.12	15	0.14	0.11	24	0.02	0.06	100	0.02	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01									<0.01						<0.01						<0.01	
Metals																								
Calcium	mg/L	0.5									670						300						490	
Calcium (filtered)	mg/L	0.5					488	469	4	488			254	246	3	254			485	483	0	485		
Magnesium	mg/L	0.5									1,700						440						1,300	
Magnesium (filtered)	mg/L	0.5					1,520	1,460	4	1,520			378	366	3	378			1,560	1,570	1	1,560		
Potassium	mg/L	0.5									600						120						450	
Potassium (filtered)	mg/L	0.5					660	635	4	660			135	131	3	135			649	654	1	649		

*RPDs have only been considered where a concentration is greater than 1 times the LOR.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

APPENDIX

C

LABORATORY CERTIFICATES

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521 [redacted]

☐ **Sydney Laboratory** Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066 02 9900 8400 EnviroSampleNSW@eurofins.com

☐ **Brisbane Laboratory** Unit 1 21 Smallwood Place Murarrie QLD 4172 07 3902 4600 EnviroSampleQLD@eurofins.com

☐ **Perth Laboratory** Unit 2 91 Leach Highway Kewdale WA 6105 08 9251 9600 EnviroSampleWA@eurofins.com

☐ **Melbourne Laboratory** 6 Monterey Road Dandenong South VIC 3175 03 8564 5000 EnviroSampleVic@eurofins.com

Company	CARDNO	Project №	WA_0089_PFASOMP	Project Manager	[redacted]
Address	11 harvest Tce WEST PERTH	Project Name	HMAS Stirling	EDD Format (ESdat, EQuIS etc)	ESdat
Contact Name	[redacted]				
Phone №					
Special Directions	Please send ESdat report to [redacted] with the project ID in the header file.				
Purchase Order	DEF19009/730				
Quote ID №					

| | | | | |

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☐ **Sydney Laboratory** Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066 02 9900 8400 EnviroSampleNSW@eurofins.com

☐ **Brisbane Laboratory** Unit 1 21 Smallwood Place Murarrie QLD 4172 07 3902 4600 EnviroSampleQLD@eurofins.com

☐ **Perth Laboratory** Unit 2 91 Leach Highway Kewdale WA 6105 08 9251 9600 EnviroSampleWA@eurofins.com

☐ **Melbourne Laboratory** 6 Monterey Road Dandenong South VIC 3175 03 8564 5000 EnviroSampleVic@eurofins.com

Company	CARDNO	Project №	WA_0089_PFASOMP	Project Manager	[redacted]
Address	11 harvest Tce WEST PERTH	Project Name	HMAS Stirling	EDD Format (ESdat, EQuIS etc)	ESdat
Contact Name	[redacted]				
Phone №	[redacted]				
Special Directions	Please send ESdat report to [redacted] with the project ID in the header file.				
Purchase Order	DEF19009/730				
Quote ID №					

Sampler(s)	
Handed over by	ALS
Email for Invoice	[redacted]
Email for Results	

Analyses — Where metals are required, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing.

Containers — Change container type & size if necessary.

Required Turnaround Time (TAT) — Default will be 5 days if not ticked.

♦Surcharge will apply

☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☒ 5 days (Standard)
☐ Other( )

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Full PFAS suite	(water) Major anions & cations	(water) TOC, TSS, TDS, pH	(sediment) TOC, CEC, pH	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	0089_QC211_210609	09/06/2021	W	X	X	X										
2	0089_QC212_210609	09/06/2021	W	X	X	X										
3																
4																
5																
6																
7																
8																
9																
10																
	Total Counts															

Method of Shipment ☐ Courier (#) ☐ Hand Delivered ☐ Postal | Name | Signature | Date | Time

Laboratory Use Only							
Received By	[redacted]	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature [redacted]	Date 10/6/21	Time 16:24	Temperature	15.6°C
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Date	Time	Report №	

Eurofins Environment Testing Australia Pty Ltd

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

eurofins | Environment Testing

ABN: 50 005 085 521 www.eurofins.com.au EnviroSales@eurofins.com

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NATA # 1261 Site # 20794

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NATA # 1261
Site # 23736

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Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

New Zealand

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Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	Cardno (WA)
Contact name:	David James
Project name:	HMAS STIRLING
Project ID:	WA_0089_PFASOMP
Turnaround time:	5 Day
Date/Time received	Jun 10, 2021 10:24 AM
Eurofins reference	802464

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

[redacted] **on phone :** [redacted] **or by email:** [redacted]

Results will be delivered electronically via email to [redacted]

Note: A copy of these results will also be delivered to the general Cardno (WA) email address.

Global Leader - Results you can trust

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 802464
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Jun 10, 2021 10:24 AM
Due: Jun 18, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217														
Brisbane Laboratory - NATA Site # 20794														
Perth Laboratory - NATA Site # 23736														
Mayfield Laboratory - NATA Site # 25079														
External Laboratory														
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**									
1	0089_QC201_210608	Jun 08, 2021		Water	M21-Jn24360		X	X	X	X			X	X
2	0089_QC202_210608	Jun 08, 2021		Water	M21-Jn24361		X	X	X	X			X	X
3	0089_QC203_210608	Jun 08, 2021		Water	M21-Jn24362		X	X	X	X			X	X
4	0089_QC204_210608	Jun 08, 2021		Soil	M21-Jn24363	X		X			X	X	X	
5	0089_QC205_210608	Jun 08, 2021		Water	M21-Jn24364		X	X	X	X			X	X
6	0089_QC206_	Jun 08, 2021		Water	M21-Jn24365		X	X	X	X			X	X

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Brisbane Laboratory - NATA Site # 20794														
Perth Laboratory - NATA Site # 23736														
Mayfield Laboratory - NATA Site # 25079														
External Laboratory														
	210608													
7	0089_QC207_210608	Jun 08, 2021		Water	M21-Jn24366		X	X	X	X			X	X
8	0089_QC208_210608	Jun 08, 2021		Soil	M21-Jn24367	X		X			X	X	X	
9	0089_QC209_210608	Jun 08, 2021		Water	M21-Jn24368		X	X	X	X			X	X
10	0089_QC210_210608	Jun 08, 2021		Water	M21-Jn24369		X	X	X	X			X	X
11	0089_QC211_210609	Jun 08, 2021		Water	M21-Jn24370		X	X	X	X			X	X
12	0089_QC212_210609	Jun 08, 2021		Water	M21-Jn24371		X	X	X	X			X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794									
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory - NATA Site # 25079									
External Laboratory									
Test Counts	2	10	12	10	10	2	2	12	10

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Certificate of Analysis

Cardno Consulting WA
11 Harvest Terrace
West Perth
WA 6005

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Attention: [redacted]

Report **802464-S**
Project name HMAS STIRLING
Project ID WA_0089_PFASOMP
Received Date Jun 10, 2021

Client Sample ID			**0089_QC204_210608**	**0089_QC208_210608**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**M21-Jn24363**	**M21-Jn24367**
Date Sampled			**Jun 08, 2021**	**Jun 08, 2021**
Test/Reference	LOR	Unit		
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	2200	2800
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	8.8	8.7
Total Organic Carbon	0.1	%	0.5	< 0.1
% Moisture	1	%	15	21
Cation Exchange Capacity				
Cation Exchange Capacity	0.05	meq/100g	27	29
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5	< 5
13C4-PFBA (surr.)	1	%	59	55
13C5-PFPeA (surr.)	1	%	71	58
13C5-PFHxA (surr.)	1	%	66	64
13C4-PFHpA (surr.)	1	%	54	47
13C8-PFOA (surr.)	1	%	62	58
13C5-PFNA (surr.)	1	%	77	72
13C6-PFDA (surr.)	1	%	55	24
13C2-PFUnDA (surr.)	1	%	57	66
13C2-PFDoDA (surr.)	1	%	89	99
13C2-PFTeDA (surr.)	1	%	90	89
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	5	ug/kg	< 5	< 5

Client Sample ID			0089_QC204_210608	0089_QC208_210608
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**M21-Jn24363**	**M21-Jn24367**
Date Sampled			**Jun 08, 2021**	**Jun 08, 2021**
Test/Reference	LOR	Unit		
Perfluoroalkyl sulfonamido substances				
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	5	ug/kg	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10	< 10
13C8-FOSA (surr.)	1	%	78	83
D3-N-MeFOSA (surr.)	1	%	78	84
D5-N-EtFOSA (surr.)	1	%	76	79
D7-N-MeFOSE (surr.)	1	%	68	69
D9-N-EtFOSE (surr.)	1	%	70	67
D5-N-EtFOSAA (surr.)	1	%	79	75
D3-N-MeFOSAA (surr.)	1	%	83	79
Perfluoroalkyl sulfonic acids (PFSAs)				
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	< 5
13C3-PFBS (surr.)	1	%	72	73
18O2-PFHxS (surr.)	1	%	97	106
13C8-PFOS (surr.)	1	%	59	59
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	< 5
13C2-4:2 FTS (surr.)	1	%	45	41
13C2-6:2 FTSA (surr.)	1	%	53	56
13C2-8:2 FTSA (surr.)	1	%	68	67
13C2-10:2 FTSA (surr.)	1	%	54	70
PFASs Summations				
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Conductivity (1:5 aqueous extract at 25°C as rec.)	Melbourne	Jun 15, 2021	7 Days
- Method: LTM-INO-4030 Conductivity			
Cation Exchange Capacity	Melbourne	Jun 16, 2021	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage			
pH (1:5 Aqueous extract at 25°C as rec.)	Melbourne	Jun 15, 2021	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Total Organic Carbon	Melbourne	Jun 16, 2021	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			
% Moisture	Melbourne	Jun 11, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Jun 15, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Jun 15, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Jun 15, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Jun 15, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Jun 11, 2021	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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3	0089_QC203_210608	Jun 08, 2021		Water	M21-Jn24362	X		X	X	X	X			X	X
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10	0089_QC210_210608	Jun 08, 2021		Water	M21-Jn24369	X		X	X	X	X			X	X
11	0089_QC211_210609	Jun 08, 2021		Water	M21-Jn24370	X		X	X	X	X			X	X
12	0089_QC212_210609	Jun 08, 2021		Water	M21-Jn24371	X		X	X	X	X			X	X

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Test Counts	10	2	10	12	10	10	2	2	12	10

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 10			10	Pass	
Total Organic Carbon	%	< 0.1			0.1	Pass	
Method Blank							
Cation Exchange Capacity							
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Total Organic Carbon	%	98			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	115			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	115			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	115			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroheptanoic acid (PFHpA)	%	132			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	105			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	119			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	138			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	118			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	122			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	141			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	126			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	133			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	109			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	121			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	116			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	123			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	107			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	124			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	101			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	92			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	111			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	122			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	125			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	118			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	52			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	87			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	133			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	116			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	129			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	97			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M21-Jn24976	NCP	%	117			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Jn24976	NCP	%	131			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Jn24976	NCP	%	127			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Jn24976	NCP	%	117			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M21-Jn24976	NCP	%	112			50-150	Pass	
Perfluorononanoic acid (PFNA)	M21-Jn24976	NCP	%	121			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M21-Jn24976	NCP	%	137			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M21-Jn24976	NCP	%	125			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M21-Jn24976	NCP	%	123			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M21-Jn24976	NCP	%	144			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Jn24976	NCP	%	126			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M21-Jn24976	NCP	%	134			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Jn24976	NCP	%	109			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Jn24976	NCP	%	116			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Jn24976	NCP	%	118			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Jn24976	NCP	%	120			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Jn24976	NCP	%	111			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Jn24976	NCP	%	113			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M21-Jn24976	NCP	%	105			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M21-Jn24976	NCP	%	93			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Jn24976	NCP	%	119			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Jn24976	NCP	%	110			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Jn24976	NCP	%	107			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Jn24976	NCP	%	148			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Jn24976	NCP	%	56			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Jn24976	NCP	%	123			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M21-Jn24976	NCP	%	121			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M21-Jn24976	NCP	%	135			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M21-Jn24976	NCP	%	130			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M21-Jn24976	NCP	%	119			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C as rec.)	M21-Jn29455	NCP	uS/cm	40	42	5.4	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	M21-Jn29455	NCP	pH Units	8.1	8.2	pass	30%	Pass	
% Moisture	B21-Jn24034	NCP	%	28	27	6.0	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorodecanoic acid (PFDA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Jn24975	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Jn24975	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Jn24975	NCP	ug/kg	12	12	4.0	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M21-Jn24975	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M21-Jn24975	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Organic Carbon	M21-Jn24367	CP	%	< 0.1	0.1	200	30%	Fail	Q15

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

[redacted] Analytical Services Manager
[redacted] Senior Analyst-Metal (VIC)
[redacted] Senior Analyst-PFAS (VIC)
[redacted] Senior Analyst-Inorganic (VIC)

[redacted]

[redacted]
General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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NATA Accredited
Accreditation Number 1261
Site Number 1254

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NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Attention: [redacted]

Report **802464-W**
Project name HMAS STIRLING
Project ID WA_0089_PFASOMP
Received Date Jun 10, 2021

Client Sample ID			**0089_QC201_210608**	**0089_QC202_210608**	**0089_QC203_210608**	**0089_QC205_210608**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M21-Jn24360**	**M21-Jn24361**	**M21-Jn24362**	**M21-Jn24364**
Date Sampled			**Jun 08, 2021**	**Jun 08, 2021**	**Jun 08, 2021**	**Jun 08, 2021**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.02	< 0.01	< 0.01	< 0.01
Chloride	1	mg/L	2100	99	20000	16000
Fluoride (Total)	0.5	mg/L	0.9	2.0	0.8	0.9
Nitrate (as N)	0.02	mg/L	8.6	< 0.02	< 0.02	2.9
pH (at 25 °C)	0.1	pH Units	8.7	8.7	7.8	8.5
Sulphate (as SO4)	5	mg/L	300	16	3000	2100
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	3600	470	45000	22000
Total Organic Carbon	5	mg/L	< 5	< 5	7.9	< 5
Total Suspended Solids Dried at 103–105°C	1	mg/L	54	1300	640	89
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	190	980	290	390
Carbonate Alkalinity (as CaCO3)	10	mg/L	11	17	< 10	16
Alkali Metals						
Calcium	0.5	mg/L	130	66	580	450
Magnesium	0.5	mg/L	130	18	1500	1100
Potassium	0.5	mg/L	36	2.2	500	390
Sodium	0.5	mg/L	960	56	12000	9000
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	0.08	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	0.12	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	0.47	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	0.02	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	75	50	88	88
13C5-PFPeA (surr.)	1	%	81	76	99	101
13C5-PFHxA (surr.)	1	%	88	85	107	112
13C4-PFHpA (surr.)	1	%	82	95	106	105
13C8-PFOA (surr.)	1	%	82	100	102	113
13C5-PFNA (surr.)	1	%	80	85	88	105

Client Sample ID			0089_QC201_210608	0089_QC202_210608	0089_QC203_210608	0089_QC205_210608
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M21-Jn24360**	**M21-Jn24361**	**M21-Jn24362**	**M21-Jn24364**
Date Sampled			**Jun 08, 2021**	**Jun 08, 2021**	**Jun 08, 2021**	**Jun 08, 2021**
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C6-PFDA (surr.)	1	%	69	84	74	93
13C2-PFUnDA (surr.)	1	%	65	78	74	86
13C2-PFDoDA (surr.)	1	%	64	71	75	88
13C2-PFTeDA (surr.)	1	%	38	42	70	58
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	107	118	107	122
D3-N-MeFOSA (surr.)	1	%	90	109	79	101
D5-N-EtFOSA (surr.)	1	%	85	105	67	94
D7-N-MeFOSE (surr.)	1	%	95	101	66	94
D9-N-EtFOSE (surr.)	1	%	88	92	54	81
D5-N-EtFOSAA (surr.)	1	%	33	49	73	76
D3-N-MeFOSAA (surr.)	1	%	29	52	84	88
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	0.14	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	0.04	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	[N09]0.15	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	[N09]0.60	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	[N09]< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	[N09]0.04	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	98	88	103	104
18O2-PFHxS (surr.)	1	%	79	73	83	93
13C8-PFOS (surr.)	1	%	69	72	65	73
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	56	67	66	70
13C2-6:2 FTSA (surr.)	1	%	61	100	79	88
13C2-8:2 FTSA (surr.)	1	%	57	78	67	82
13C2-10:2 FTSA (surr.)	1	%	45	58	60	69

Client Sample ID			0089_QC201_210608	0089_QC202_210608	0089_QC203_210608	0089_QC205_210608
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Jn24360	M21-Jn24361	M21-Jn24362	M21-Jn24364
Date Sampled			Jun 08, 2021	Jun 08, 2021	Jun 08, 2021	Jun 08, 2021
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	0.64	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	0.04	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	0.64	< 0.01	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	1.47	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	1.66	< 0.1	< 0.1

Client Sample ID			0089_QC206_210608	0089_QC207_210608	0089_QC209_210608	0089_QC210_210608
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M21-Jn24365	M21-Jn24366	M21-Jn24368	M21-Jn24369
Date Sampled			Jun 08, 2021	Jun 08, 2021	Jun 08, 2021	Jun 08, 2021
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Chloride	1	mg/L	37	20000	20000	20000
Fluoride (Total)	0.5	mg/L	0.7	0.8	0.8	0.9
Nitrate (as N)	0.02	mg/L	2.0	< 0.02	< 0.02	< 0.02
pH (at 25 °C)	0.1	pH Units	8.5	8.4	8.6	8.5
Sulphate (as SO4)	5	mg/L	52	3000	3000	3000
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	440	15000	32000	39000
Total Organic Carbon	5	mg/L	8.3	< 5	< 5	13
Total Suspended Solids Dried at 103–105°C	1	mg/L	130	33	42	310
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	500	140	110	120
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	13	11
Alkali Metals						
Calcium	0.5	mg/L	99	560	640	600
Magnesium	0.5	mg/L	18	1400	1800	1700
Potassium	0.5	mg/L	3.3	470	560	550
Sodium	0.5	mg/L	22	11000	14000	13000
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	0.25	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	[N09]0.69	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	[N09]2.6	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	[N09]0.29	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	[N09]1.1	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	0.02	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	64	87	89	92
13C5-PFPeA (surr.)	1	%	60	93	95	100
13C5-PFHxA (surr.)	1	%	108	111	108	116
13C4-PFHpA (surr.)	1	%	90	108	102	113
13C8-PFOA (surr.)	1	%	68	108	108	107
13C5-PFNA (surr.)	1	%	83	90	105	89

Client Sample ID			0089_QC206_210608	0089_QC207_210608	0089_QC209_210608	0089_QC210_210608
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M21-Jn24365**	**M21-Jn24366**	**M21-Jn24368**	**M21-Jn24369**
Date Sampled			**Jun 08, 2021**	**Jun 08, 2021**	**Jun 08, 2021**	**Jun 08, 2021**
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C6-PFDA (surr.)	1	%	23	76	105	74
13C2-PFUnDA (surr.)	1	%	76	86	106	78
13C2-PFDoDA (surr.)	1	%	82	88	108	79
13C2-PFTeDA (surr.)	1	%	42	81	87	61
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	129	108	135	108
D3-N-MeFOSA (surr.)	1	%	92	85	106	78
D5-N-EtFOSA (surr.)	1	%	84	82	95	75
D7-N-MeFOSE (surr.)	1	%	83	80	93	75
D9-N-EtFOSE (surr.)	1	%	76	70	81	65
D5-N-EtFOSAA (surr.)	1	%	70	97	113	67
D3-N-MeFOSAA (surr.)	1	%	86	90	115	73
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	0.39	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	[R16]< 0.02	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	0.16	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	[N09]0.73	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	[N09]16	< 0.01	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	[N09]1.5	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]55	[N09]0.02	< 0.01	[N09]0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	[R16]< 0.02	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	65	103	103	111
18O2-PFHxS (surr.)	1	%	82	89	93	88
13C8-PFOS (surr.)	1	%	80	70	78	69
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	0.08	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	82	68	68	71
13C2-6:2 FTSA (surr.)	1	%	144	87	80	91
13C2-8:2 FTSA (surr.)	1	%	81	64	78	61
13C2-10:2 FTSA (surr.)	1	%	99	80	86	66

Client Sample ID			0089_QC206_210608	0089_QC207_210608	0089_QC209_210608	0089_QC210_210608
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M21-Jn24365**	**M21-Jn24366**	**M21-Jn24368**	**M21-Jn24369**
Date Sampled			**Jun 08, 2021**	**Jun 08, 2021**	**Jun 08, 2021**	**Jun 08, 2021**
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	71	0.02	< 0.01	0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	56.1	0.02	< 0.01	0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	72.1	0.02	< 0.01	0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	76.4	< 0.05	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	78.81	< 0.1	< 0.1	< 0.1

Client Sample ID			0089_QC211_210609	0089_QC212_210609
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**M21-Jn24370**	**M21-Jn24371**
Date Sampled			**Jun 08, 2021**	**Jun 08, 2021**
Test/Reference	LOR	Unit		
Ammonia (as N)	0.01	mg/L	0.01	0.26
Chloride	1	mg/L	420	10000
Fluoride (Total)	0.5	mg/L	1.3	0.9
Nitrate (as N)	0.02	mg/L	18	0.04
pH (at 25 °C)	0.1	pH Units	8.9	8.8
Sulphate (as SO4)	5	mg/L	180	1400
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	1200	13000
Total Organic Carbon	5	mg/L	< 5	< 5
Total Suspended Solids Dried at 103–105°C	1	mg/L	2800	280
Alkalinity (speciated)				
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	2000	330
Carbonate Alkalinity (as CaCO3)	10	mg/L	35	30
Alkali Metals				
Calcium	0.5	mg/L	68	420
Magnesium	0.5	mg/L	56	780
Potassium	0.5	mg/L	15	230
Sodium	0.5	mg/L	250	6200
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	0.11
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	0.09
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	[N09]0.05
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	71	54
13C5-PFPeA (surr.)	1	%	79	91
13C5-PFHxA (surr.)	1	%	90	108
13C4-PFHpA (surr.)	1	%	80	103
13C8-PFOA (surr.)	1	%	75	105
13C5-PFNA (surr.)	1	%	86	108

Client Sample ID			0089_QC211_210609	0089_QC212_210609
Sample Matrix			Water	Water
Eurofins Sample No.			M21-Jn24370	M21-Jn24371
Date Sampled			Jun 08, 2021	Jun 08, 2021
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs)				
13C6-PFDA (surr.)	1	%	67	90
13C2-PFUnDA (surr.)	1	%	54	80
13C2-PFDoDA (surr.)	1	%	53	103
13C2-PFTeDA (surr.)	1	%	53	85
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	92	91
D3-N-MeFOSA (surr.)	1	%	83	86
D5-N-EtFOSA (surr.)	1	%	77	71
D7-N-MeFOSE (surr.)	1	%	67	72
D9-N-EtFOSE (surr.)	1	%	63	61
D5-N-EtFOSAA (surr.)	1	%	61	130
D3-N-MeFOSAA (surr.)	1	%	56	131
Perfluoroalkyl sulfonic acids (PFSAs)				
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	0.02	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	[N09]0.02	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	98	102
18O2-PFHxS (surr.)	1	%	77	91
13C8-PFOS (surr.)	1	%	75	80
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	1.2
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	69	83
13C2-6:2 FTSA (surr.)	1	%	86	122
13C2-8:2 FTSA (surr.)	1	%	67	114
13C2-10:2 FTSA (surr.)	1	%	60	121

Client Sample ID			0089_QC211_210609	0089_QC212_210609
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**M21-Jn24370**	**M21-Jn24371**
Date Sampled			**Jun 08, 2021**	**Jun 08, 2021**
Test/Reference	LOR	Unit		
PFASs Summations				
Sum (PFHxS + PFOS)*	0.01	ug/L	0.02	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.02	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	1.45
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	1.45

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B11			
Ammonia (as N)	Melbourne	Jun 11, 2021	28 Days
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Chloride	Melbourne	Jun 11, 2021	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Nitrate (as N)	Melbourne	Jun 11, 2021	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Sulphate (as SO4)	Melbourne	Jun 11, 2021	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Alkalinity (speciated)	Melbourne	Jun 11, 2021	14 Days
- Method: LTM-INO-4250 Alkalinity by Electrometric Titration			
Alkali Metals	Melbourne	Jun 11, 2021	180 Days
- Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES			
Fluoride (Total)	Melbourne	Jun 16, 2021	28 Days
- Method: APHA 4500 F-C Fluoride by Ion Selective Electrode			
pH (at 25 °C)	Melbourne	Jun 11, 2021	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Total Organic Carbon	Melbourne	Jun 11, 2021	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			
Total Suspended Solids Dried at 103–105°C	Melbourne	Jun 11, 2021	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Total Dissolved Solids Dried at 180°C ± 2°C	Melbourne	Jun 11, 2021	7 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Jun 11, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Jun 11, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Jun 11, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Jun 11, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Jun 11, 2021	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009/730
Report #: 802464
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Jun 10, 2021 10:24 AM
Due: Jun 18, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Fluoride (Total)	pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217															
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory - NATA Site # 25079															
External Laboratory															
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**										
1	0089_QC201_210608	Jun 08, 2021		Water	M21-Jn24360	X		X	X	X	X			X	X
2	0089_QC202_210608	Jun 08, 2021		Water	M21-Jn24361	X		X	X	X	X			X	X
3	0089_QC203_210608	Jun 08, 2021		Water	M21-Jn24362	X		X	X	X	X			X	X
4	0089_QC204_210608	Jun 08, 2021		Soil	M21-Jn24363		X		X			X	X	X	
5	0089_QC205_210608	Jun 08, 2021		Water	M21-Jn24364	X		X	X	X	X			X	X
6	0089_QC206_	Jun 08, 2021		Water	M21-Jn24365	X		X	X	X	X			X	X

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Sample Detail						Fluoride (Total)	pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217															
Brisbane Laboratory - NATA Site # 20794															
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory - NATA Site # 25079															
External Laboratory															
	210608														
7	0089_QC207_210608	Jun 08, 2021		Water	M21-Jn24366	X		X	X	X	X			X	X
8	0089_QC208_210608	Jun 08, 2021		Soil	M21-Jn24367		X		X			X	X	X	
9	0089_QC209_210608	Jun 08, 2021		Water	M21-Jn24368	X		X	X	X	X			X	X
10	0089_QC210_210608	Jun 08, 2021		Water	M21-Jn24369	X		X	X	X	X			X	X
11	0089_QC211_210609	Jun 08, 2021		Water	M21-Jn24370	X		X	X	X	X			X	X
12	0089_QC212_210609	Jun 08, 2021		Water	M21-Jn24371	X		X	X	X	X			X	X

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Sample Detail	Fluoride (Total)	pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Eurofins Suite B11	Moisture Set	Cation Exchange Capacity	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
Mayfield Laboratory - NATA Site # 25079										
External Laboratory										
Test Counts	10	2	10	12	10	10	2	2	12	10

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chloride	mg/L	< 1			1	Pass	
Fluoride (Total)	mg/L	< 0.5			0.5	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10			10	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Ammonia (as N)	%	99			70-130	Pass	
Chloride	%	113			70-130	Pass	
Nitrate (as N)	%	100			70-130	Pass	
Sulphate (as SO4)	%	104			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	98			70-130	Pass	
Total Organic Carbon	%	101			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	95			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	119			80-120	Pass	
Magnesium	%	110			80-120	Pass	
Potassium	%	102			80-120	Pass	
Sodium	%	101			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	96			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	112			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	99			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	88			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	92			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	93			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	94			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	100			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	99			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	147			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	111			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	107			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	117			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	116			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	103			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	123			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	109			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	127			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	89			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	107			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	90			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	100			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	101			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	101			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	107			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	88			50-150	Pass	
LCS - % Recovery							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	109			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	147			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	117			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	88			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Ammonia (as N)	S21-Jn26093	NCP	%	97			70-130	Pass	
Nitrate (as N)	S21-Jn26093	NCP	%	100			70-130	Pass	
Total Organic Carbon	M21-Fe07322	NCP	%	90			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Potassium	S21-Jn20306	NCP	%	119			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M21-Jn24361	CP	%	126			75-125	Fail	Q08
Sodium	M21-Jn24361	CP	%	84			75-125	Pass	
Spike - % Recovery									
				Result 1					
Total Suspended Solids Dried at 103–105°C	M21-Jn24365	CP	%	112			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M21-Jn24369	CP	%	92			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Jn24369	CP	%	97			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Jn24369	CP	%	94			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Jn24369	CP	%	90			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M21-Jn24369	CP	%	89			50-150	Pass	
Perfluorononanoic acid (PFNA)	M21-Jn24369	CP	%	88			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M21-Jn24369	CP	%	99			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M21-Jn24369	CP	%	105			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M21-Jn24369	CP	%	98			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M21-Jn24369	CP	%	145			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Jn24369	CP	%	106			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M21-Jn24369	CP	%	108			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Jn24369	CP	%	109			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Jn24369	CP	%	110			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Jn24369	CP	%	105			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Jn24369	CP	%	113			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Jn24369	CP	%	108			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Jn24369	CP	%	113			50-150	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M21-Jn24369	CP	%	87			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M21-Jn24369	CP	%	95			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Jn24369	CP	%	90			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Jn24369	CP	%	96			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Jn24369	CP	%	97			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Jn24369	CP	%	90			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Jn24369	CP	%	88			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Jn24369	CP	%	87			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M21-Jn24369	CP	%	106			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M21-Jn24369	CP	%	131			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M21-Jn24369	CP	%	113			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M21-Jn24369	CP	%	102			50-150	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M21-Jn24371	CP	%	89			75-125	Pass	
Magnesium	M21-Jn24371	CP	%	104			75-125	Pass	
Sodium	M21-Jn24371	CP	%	128			75-125	Fail	Q08
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	S21-Jn26093	NCP	mg/L	0.02	0.02	5.0	30%	Pass	
Chloride	B21-Jn20322	NCP	mg/L	350	370	5.0	30%	Pass	
Fluoride (Total)	N21-Jn21003	NCP	mg/L	0.8	0.8	2.1	30%	Pass	
Nitrate (as N)	S21-Jn26093	NCP	mg/L	0.02	0.03	9.0	30%	Pass	
pH (at 25 °C)	M21-Jn24032	NCP	pH Units	8.2	8.2	pass	30%	Pass	
Sulphate (as SO4)	B21-Jn20322	NCP	mg/L	47	45	4.0	30%	Pass	
Total Organic Carbon	B21-Jn20917	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M21-Jn24032	NCP	mg/L	54	53	2.0	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M21-Jn24032	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Suspended Solids Dried at 103–105°C	M21-Jn24365	CP	mg/L	130	130	2.0	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M21-Jn24368	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M21-Jn24368	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Jn24368	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Jn24368	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Jn24368	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Jn24368	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Jn24368	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Jn24368	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M21-Jn24368	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M21-Jn24368	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
Total Dissolved Solids Dried at 180°C ± 2°C	M21-Jn24370	CP	mg/L	1200	1200	1.0	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M21-Jn24371	CP	mg/L	420	450	6.0	30%	Pass	
Magnesium	M21-Jn24371	CP	mg/L	780	810	4.0	30%	Pass	
Potassium	M21-Jn24371	CP	mg/L	230	240	3.0	30%	Pass	
Sodium	M21-Jn24371	CP	mg/L	6200	6300	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
R16	The LORs have been raised due to the high concentration of one or more analytes

Authorised by:

[redacted] Analytical Services Manager
[redacted] Senior Analyst-Metal (VIC)
[redacted] Senior Analyst-PFAS (VIC)
[redacted] Senior Analyst-Inorganic (VIC)

[redacted]

[redacted]
General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☐ **Sydney Laboratory** Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066 02 9900 8400 EnviroSampleNSW@eurofins.com

☐ **Brisbane Laboratory** Unit 1 21 Smallwood Place Murarrie QLD 4172 07 3902 4600 EnviroSampleQLD@eurofins.com

☐ **Perth Laboratory** Unit 2 91 Leach Highway Kewdale WA 6105 08 9251 9600 EnviroSampleWA@eurofins.com

☐ **Melbourne Laboratory** 6 Monterey Road Dandenong South VIC 3175 03 8564 5000 EnviroSampleVic@eurofins.com

Company	CARDNO	Project №	WA_0089_PFASOMP	Project Manager	[redacted]
Address	11 harvest Tce WEST PERTH	Project Name	HMAS Stirling	EDD Format ESdat, EQuIS etc	ESdat
Contact Name	[redacted]				
Phone №					
Special Directions	Please send ESdat report to [redacted] with the project ID in the header file.				
Purchase Order	DEF19009/730				
Quote ID №					

Sampler(s)	
Handed over by	ALS
Email for Invoice	[redacted]
Email for Results	[redacted]

Analyses Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing.

Containers Change container type & size if necessary.

Required Turnaround Time (TAT) Default will be 5 days if not ticked.

♦Surcharge will apply

☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☒ 5 days (Standard)
☐ Other( )

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Full PFAS suite	(water) Major anions & cations	(water) TOC, TSS, TDS, pH	(sediment) TOC, CEC, pH	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	0089_QC213_210610	10/06/2021	W	X	X	X										
2	0089_QC214_210610	10/06/2021	W	X	X	X										
3	0089_QC215_210610	10/06/2021	W	X	X	X										
4	0089_QC216_210610	10/06/2021	S	X			X									
5	0089_QC217_210610	10/06/2021	S	X			X									
6	0089_QC218_210610	10/06/2021	W	X	X	X										
7																
8																
9																
10																
		Total Counts														

Date/Time: 14/6/21 15:13
Chilled:
Temp: 19.0 19.2 19.2
Correction: +0.1
Final Temp: 19.2°C

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature		Date		Time		Time	
Laboratory Use Only	Received By	[redacted]	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	[redacted]	Date	14/6/21	Time	15:13	Temperature	19.2°C
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №	80734

Eurofins Environment Testing Australia Pty Ltd

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

eurofins | Environment Testing

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NATA # 1261 Site # 18217

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NATA # 1261 Site # 20794

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Site # 23736

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IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	Cardno (WA)
Contact name:	[redacted]
Project name:	HMAS STIRLING
Project ID:	WA_0089)PFASOMP
Turnaround time:	5 Day
Date/Time received	Jun 14, 2021 3:13 PM
Eurofins reference	802734

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

[redacted] **on phone :** [redacted] **or by email:** [redacted]

Results will be delivered electronically via email to [redacted] - [redacted]

Note: A copy of these results will also be delivered to the general Cardno (WA) email address.

Global Leader - Results you can trust

eurofins | Environment Testing

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Phone : 0800 856 450
IANZ # 1290

Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HMAS STIRLING
Project ID: WA_0089)PFASOMP

Order No.: DEF19009/730
Report #: 802734
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Jun 14, 2021 3:13 PM
Due: Jun 21, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail	pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Moisture Set	Cation Exchange Capacity	Eurofins Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs)	Eurofins Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271	X	X	X	X	X	X	X		X	X
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794								X		
Perth Laboratory - NATA Site # 23736					X					
Mayfield Laboratory - NATA Site # 25079										
External Laboratory										

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID									
1	0089_QC213_210610	Jun 10, 2021		Water	P21-Jn27133		X	X	X			X	X	X	X
2	0089_QC214_210610	Jun 10, 2021		Water	P21-Jn27134		X	X	X			X	X	X	X
3	0089_QC215_210610	Jun 10, 2021		Water	P21-Jn27135		X	X	X			X	X	X	X
4	0089_QC216_210610	Jun 10, 2021		Soil	P21-Jn27136	X		X		X	X		X		
5	0089_QC217_210610	Jun 10, 2021		Soil	P21-Jn27137	X		X		X	X		X		
6	0089_QC218_	Jun 10, 2021		Water	P21-Jn27138		X	X	X			X	X	X	X

eurofins | Environment Testing

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Company Name: Cardno (WA)
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West Perth
WA 6005

Project Name: HMAS STIRLING
Project ID: WA_0089)PFASOMP

Order No.: DEF19009/730
Report #: 802734
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Jun 14, 2021 3:13 PM
Due: Jun 21, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail	pH (1:5 Aqueous extract at 25°C as rec.)	pH (at 25 °C)	Total Organic Carbon	Total Suspended Solids Dried at 103–105°C	Moisture Set	Cation Exchange Capacity	Eurofins Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs)	Eurofins Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271	X	X	X	X	X	X	X		X	X
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794								X		
Perth Laboratory - NATA Site # 23736					X					
Mayfield Laboratory - NATA Site # 25079										
External Laboratory										
210610										
Test Counts	2	4	6	4	2	2	4	6	4	4

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106448**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 12:45
Order number	: DEF19009/730	Date Analysis Commenced	: 11-Jun-2021
C-O-C number	: 23821	Issue Date	: 22-Jun-2021 12:15
Sampler	: [redacted]		
Site	: MB DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231X: PFAS results for sample #10, #11 confirmed by re-extraction and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW121_210608	0089_MW123_210608	0089_QC102_210608	0089_MW120_210608	0089_MW112_210608
				Sampling date / time	08-Jun-2021 08:49	08-Jun-2021 09:13	08-Jun-2021 09:16	08-Jun-2021 09:31	08-Jun-2021 09:47
					EP2106448-001	EP2106448-002	EP2106448-003	EP2106448-004	EP2106448-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.05	7.76	7.70	7.97	7.94
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		476	518	531	360	362
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		59	5200	3490	40	316
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		218	334	346	235	228
Total Alkalinity as CaCO3	----	1	mg/L		218	334	346	235	228
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		25	6	5	21	31
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		54	88	95	40	33
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		89	94	98	80	84
Magnesium	7439-95-4	1	mg/L		16	17	19	17	11
Sodium	7440-23-5	1	mg/L		29	53	58	29	23
Potassium	7440-09-7	1	mg/L		3	3	3	3	2
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		6.40	9.28	9.70	6.26	6.13
ø Total Cations	----	0.01	meq/L		7.10	8.47	9.05	6.73	6.15
ø Ionic Balance	----	0.01	%		5.16	4.56	3.43	3.61	0.14
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		5	24	13	6	6
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.09	0.16	0.16	0.05	0.16
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.30	0.13	0.14	0.05	1.01
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		10.5	0.68	0.60	2.25	30.4
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		0.39	<0.02	<0.02	0.45	4.54

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW121_210608	0089_MW123_210608	0089_QC102_210608	0089_MW120_210608	0089_MW112_210608
				Sampling date / time	08-Jun-2021 08:49	08-Jun-2021 09:13	08-Jun-2021 09:16	08-Jun-2021 09:31	08-Jun-2021 09:47
Compound	CAS Number	LOR	Unit		EP2106448-001	EP2106448-002	EP2106448-003	EP2106448-004	EP2106448-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**2.86**	**0.07**	**0.05**	**3.88**	**26.8**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.1**	<0.1	<0.1	<0.1	**0.2**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.26**	**0.14**	**0.13**	**0.03**	**0.56**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.99**	**0.62**	**0.54**	**0.17**	**2.95**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.16**	**0.02**	<0.02	<0.02	**0.53**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.28**	<0.01	<0.01	**0.13**	**3.76**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.25**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW121_210608	0089_MW123_210608	0089_QC102_210608	0089_MW120_210608	0089_MW112_210608
				Sampling date / time	08-Jun-2021 08:49	08-Jun-2021 09:13	08-Jun-2021 09:16	08-Jun-2021 09:31	08-Jun-2021 09:47
					EP2106448-001	EP2106448-002	EP2106448-003	EP2106448-004	EP2106448-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**0.06**	<0.05	<0.05	<0.05	**0.19**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**16.0**	**1.82**	**1.62**	**7.01**	**71.4**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**13.4**	**0.75**	**0.65**	**6.13**	**57.2**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**15.3**	**1.69**	**1.48**	**6.51**	**65.6**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**98.1**	**91.4**	**108**	**110**	**78.2**
13C8-PFOA	----	0.02	%		**98.5**	**103**	**100**	**105**	**102**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW117_210608	0089_QC106_210608	0089_MW109_210608	0089_MW124_210608	0089_MW125_210608
				Sampling date / time	08-Jun-2021 10:16	08-Jun-2021 10:17	08-Jun-2021 10:37	08-Jun-2021 11:16	08-Jun-2021 11:27
Compound	CAS Number	LOR	Unit		EP2106448-006	EP2106448-007	EP2106448-008	EP2106448-009	EP2106448-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.65	7.67	7.81	7.55	7.54
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		626	602	544	33000	34900
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		352	144	408	92	26
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		454	433	344	360	407
Total Alkalinity as CaCO3	----	1	mg/L		454	433	344	360	407
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		37	36	21	1920	1980
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		36	36	96	14700	15400
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		150	150	106	447	471
Magnesium	7439-95-4	1	mg/L		18	18	24	1110	1200
Sodium	7440-23-5	1	mg/L		24	24	65	8200	8770
Potassium	7440-09-7	1	mg/L		4	4	2	459	499
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		10.8	10.4	10.0	462	484
ø Total Cations	----	0.01	meq/L		10.1	10.1	10.1	482	516
ø Ionic Balance	----	0.01	%		3.55	1.48	0.62	2.14	3.27
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		14	16	8	13	8
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.46	<0.02	0.43	0.12	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.99	0.02	0.94	0.26	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		18.6	0.52	15.2	1.57	0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		2.22	0.09	1.99	0.03	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW117_210608	0089_QC106_210608	0089_MW109_210608	0089_MW124_210608	0089_MW125_210608
				Sampling date / time	08-Jun-2021 10:16	08-Jun-2021 10:17	08-Jun-2021 10:37	08-Jun-2021 11:16	08-Jun-2021 11:27
					EP2106448-006	EP2106448-007	EP2106448-008	EP2106448-009	EP2106448-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**47.3**	**4.95**	**38.0**	**0.17**	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.3**	<0.1	**0.2**	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.68**	<0.02	**0.64**	**0.07**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**3.96**	**0.08**	**3.70**	**0.42**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.27**	<0.02	**0.25**	**0.03**	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**1.02**	**0.04**	**0.94**	**0.05**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW117_210608	0089_QC106_210608	0089_MW109_210608	0089_MW124_210608	0089_MW125_210608
				Sampling date / time	08-Jun-2021 10:16	08-Jun-2021 10:17	08-Jun-2021 10:37	08-Jun-2021 11:16	08-Jun-2021 11:27
					EP2106448-006	EP2106448-007	EP2106448-008	EP2106448-009	EP2106448-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**0.06**	<0.05	**0.06**	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**75.9**	**5.70**	**62.4**	**2.72**	**0.04**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**65.9**	**5.47**	**53.2**	**1.74**	**0.04**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**72.6**	**5.59**	**59.4**	**2.43**	**0.04**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**71.8**	**99.3**	**73.7**	**102**	**105**
13C8-PFOA	----	0.02	%		**102**	**101**	**99.0**	**102**	**102**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW126_210608	0089_MW127_210608	----	----	----
				Sampling date / time	08-Jun-2021 11:40	08-Jun-2021 11:51	----	----	----
Compound	CAS Number	LOR	Unit		EP2106448-011	EP2106448-012	--------	--------	--------
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.51	7.42	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		24500	31900	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		64	130	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		444	478	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		444	478	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1870	1770	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		14200	14200	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		451	398	----	----	----
Magnesium	7439-95-4	1	mg/L		1160	1150	----	----	----
Sodium	7440-23-5	1	mg/L		8180	7940	----	----	----
Potassium	7440-09-7	1	mg/L		448	440	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		448	447	----	----	----
ø Total Cations	----	0.01	meq/L		485	471	----	----	----
ø Ionic Balance	----	0.01	%		3.95	2.63	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		11	20	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.11	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.10	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.30	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW126_210608	0089_MW127_210608	----	----	----
				Sampling date / time	08-Jun-2021 11:40	08-Jun-2021 11:51	----	----	----
Compound	CAS Number	LOR	Unit		EP2106448-011	EP2106448-012	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.02**	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.02**	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.10**	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW126_210608	0089_MW127_210608	----	----	----
				Sampling date / time	08-Jun-2021 11:40	08-Jun-2021 11:51	----	----	----
Compound	CAS Number	LOR	Unit		EP2106448-011	EP2106448-012	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.65**	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.32**	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.55**	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**108**	----	----	----
13C8-PFOA	----	0.02	%		**104**	**103**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106448**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 11-Jun-2021
C-O-C number	: 23821	Issue Date	: 22-Jun-2021
Sampler	: [redacted]		
Site	: MB DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3741336)									
EP2106448-002	0089_MW123_210608	EA005-P: pH Value	----	0.01	pH Unit	7.76	7.67	1.2	0% - 20%
EP2106448-012	0089_MW127_210608	EA005-P: pH Value	----	0.01	pH Unit	7.42	7.45	0.4	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3733890)									
EP2106448-001	0089_MW121_210608	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	476	449	5.8	0% - 20%
EP2106448-009	0089_MW124_210608	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	33000	32500	1.3	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3733891)									
EP2106448-001	0089_MW121_210608	EA025H: Suspended Solids (SS)	----	5	mg/L	59	56	4.3	0% - 50%
EP2106448-011	0089_MW126_210608	EA025H: Suspended Solids (SS)	----	5	mg/L	64	74	14.9	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3741335)									
EP2106448-002	0089_MW123_210608	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	334	351	5.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	334	351	5.0	0% - 20%
EP2106448-012	0089_MW127_210608	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	478	483	1.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	478	483	1.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3729883)									
EP2106448-001	0089_MW121_210608	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	25	25	0.0	0% - 20%
EP2106448-011	0089_MW126_210608	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1870	1910	2.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3729884)									
EP2106448-001	0089_MW121_210608	ED045G: Chloride	16887-00-6	1	mg/L	54	53	0.0	0% - 20%
EP2106448-011	0089_MW126_210608	ED045G: Chloride	16887-00-6	1	mg/L	14200	14400	1.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3731462)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3731462) - continued									
EP2106448-001	0089_MW121_210608	ED093F: Calcium	7440-70-2	1	mg/L	89	91	2.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	16	16	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	29	29	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EP2106448-011	0089_MW126_210608	ED093F: Calcium	7440-70-2	1	mg/L	451	443	1.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1160	1140	1.9	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	8180	8020	2.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	448	438	2.2	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3732329)									
EP2106552-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	6	5	0.0	No Limit
EP2106628-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3740653)									
EP2106448-002	0089_MW123_210608	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.07	0.07	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.16	0.17	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.13	0.12	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.68	0.61	11.6	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2106450-005	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.01	0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3740653)									
EP2106448-002	0089_MW123_210608	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.14	0.13	8.2	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.62	0.56	11.1	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2106450-005	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3740653) - continued									
EP2106450-005	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740653)									
EP2106448-002	0089_MW123_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106450-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3740653)									
EP2106448-002	0089_MW123_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3740653) - continued									
EP2106448-002	0089_MW123_210608	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106450-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3740653)									
EP2106448-002	0089_MW123_210608	EP231X: Sum of PFAS	----	0.01	µg/L	1.82	1.68	8.0	0% - 20%
EP2106450-005	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.01	0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3741336)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3733890)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	105	88.1	114
				<10	1000 mg/L	103	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3733891)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	103	89.1	120
				<5	1000 mg/L	102	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3741335)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	102	81.2	126
				<1	200 mg/L	96.9	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729883)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	87.7	113
				<1	500 mg/L	106	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3729884)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.4	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3731462)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.1	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.1	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3732329)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	104	87.2	116
				<1	100 mg/L	103	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740653)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	111	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	86.0	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740653) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	106	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	67.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740653)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	98.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	# 0.02	0.25 µg/L	110	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	114	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	116	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	121	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	98.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	103	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740653)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	122	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	104	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	112	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	106	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	125	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	109	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740653)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	108	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	117	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	96.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	95.8	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729883)							
EP2106448-001	0089_MW121_210608	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	103	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3729884)							
EP2106448-001	0089_MW121_210608	ED045G: Chloride	16887-00-6	1000 mg/L	98.8	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3732329)							
EP2106448-002	0089_MW123_210608	EP005: Total Organic Carbon	----	500 mg/L	96.2	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740653)							
EP2106448-008	0089_MW109_210608	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	# Not Determined	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	# Not Determined	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	# Not Determined	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	# Not Determined	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	# Not Determined	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	# 145	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740653)							
EP2106448-008	0089_MW109_210608	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	# 71.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	# Not Determined	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	# Not Determined	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	99.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	97.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	108	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	106	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	90.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	95.3	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740653)							
EP2106448-008	0089_MW109_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	112	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	100	62.6	147

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740653) - continued							
EP2106448-008	0089_MW109_210608	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	92.2	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	109	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	115	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	103	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740653)							
EP2106448-008	0089_MW109_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	108	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	67.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	84.6	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	99.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106448**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: MB DEF19009/Stirling GW	Issue Date	: 22-Jun-2021
Sampler	: [redacted]	No. of samples received	: 12
Order number	: DEF19009/730	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Method Blank value outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Method Blank (MB) Values							
EP231B: Perfluoroalkyl Carboxylic Acids	QC-3740653-001	----	**Perfluorohexanoic acid (PFHxA)**	307-24-4	0.02 µg/L	0.02 µg/L	**Blank result exceeds permitted value**
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2106448--008	0089_MW109_210608	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2106448--008	0089_MW109_210608	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2106448--008	0089_MW109_210608	**Perfluoroheptane sulfonic acid (PFHpS)**	375-92-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2106448--008	0089_MW109_210608	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2106448--008	0089_MW109_210608	**Perfluorodecane sulfonic acid (PFDS)**	335-77-3	145 %	53.0-142%	**Recovery greater than upper data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2106448--008	0089_MW109_210608	**Perfluorobutanoic acid (PFBA)**	375-22-4	71.8 %	73.0-129%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2106448--008	0089_MW109_210608	**Perfluorohexanoic acid (PFHxA)**	307-24-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2106448--008	0089_MW109_210608	**Perfluorooctanoic acid (PFOA)**	335-67-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW121_210608,	0089_MW123_210608,	----	----	----	17-Jun-2021	08-Jun-2021	**9**
0089_QC102_210608,	0089_MW120_210608,						
0089_MW112_210608,	0089_MW117_210608,						
0089_QC106_210608,	0089_MW109_210608,						
0089_MW124_210608,	0089_MW125_210608,						
0089_MW126_210608,	0089_MW127_210608						

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW121_210608, 0089_MW123_210608, 0089_QC102_210608, 0089_MW120_210608, 0089_MW112_210608, 0089_MW117_210608, 0089_QC106_210608, 0089_MW109_210608, 0089_MW124_210608, 0089_MW125_210608, 0089_MW126_210608, 0089_MW127_210608	**08-Jun-2021**	**----**	----	----	**17-Jun-2021**	08-Jun-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW121_210608, 0089_MW123_210608, 0089_QC102_210608, 0089_MW120_210608, 0089_MW112_210608, 0089_MW117_210608, 0089_QC106_210608, 0089_MW109_210608, 0089_MW124_210608, 0089_MW125_210608, 0089_MW126_210608, 0089_MW127_210608	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	15-Jun-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW121_210608, 0089_MW123_210608, 0089_QC102_210608, 0089_MW120_210608, 0089_MW112_210608, 0089_MW117_210608, 0089_QC106_210608, 0089_MW109_210608, 0089_MW124_210608, 0089_MW125_210608, 0089_MW126_210608, 0089_MW127_210608	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	15-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW121_210608, 0089_MW123_210608, 0089_QC102_210608, 0089_MW120_210608, 0089_MW112_210608, 0089_MW117_210608, 0089_QC106_210608, 0089_MW109_210608, 0089_MW124_210608, 0089_MW125_210608, 0089_MW126_210608, 0089_MW127_210608	**08-Jun-2021**	**----**	----	----	**17-Jun-2021**	22-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_MW121_210608,	0089_MW123_210608,	**08-Jun-2021**	**----**	----	----	**21-Jun-2021**	06-Jul-2021	✓
0089_QC102_210608,	0089_MW120_210608,							
0089_MW112_210608,	0089_MW117_210608,							
0089_QC106_210608,	0089_MW109_210608,							
0089_MW124_210608,	0089_MW125_210608,							
0089_MW126_210608,	0089_MW127_210608							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_MW121_210608,	0089_MW123_210608,	**08-Jun-2021**	**----**	----	----	**21-Jun-2021**	06-Jul-2021	✓
0089_QC102_210608,	0089_MW120_210608,							
0089_MW112_210608,	0089_MW117_210608,							
0089_QC106_210608,	0089_MW109_210608,							
0089_MW124_210608,	0089_MW125_210608,							
0089_MW126_210608,	0089_MW127_210608							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_MW121_210608,	0089_MW123_210608,	**08-Jun-2021**	**----**	----	----	**15-Jun-2021**	15-Jun-2021	✓
0089_QC102_210608,	0089_MW120_210608,							
0089_MW112_210608,	0089_MW117_210608,							
0089_QC106_210608,	0089_MW109_210608,							
0089_MW124_210608,	0089_MW125_210608,							
0089_MW126_210608,	0089_MW127_210608							
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005)								
0089_MW121_210608,	0089_MW123_210608,	**08-Jun-2021**	**----**	----	----	**11-Jun-2021**	06-Jul-2021	✓
0089_QC102_210608,	0089_MW120_210608,							
0089_MW112_210608,	0089_MW117_210608,							
0089_QC106_210608,	0089_MW109_210608,							
0089_MW124_210608,	0089_MW125_210608,							
0089_MW126_210608,	0089_MW127_210608							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW121_210608,	0089_MW123_210608,	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
0089_QC102_210608,	0089_MW120_210608,							
0089_MW112_210608,	0089_MW117_210608,							
0089_QC106_210608,	0089_MW109_210608,							
0089_MW124_210608,	0089_MW125_210608,							
0089_MW126_210608,	0089_MW127_210608							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW121_210608, 0089_QC102_210608, 0089_MW112_210608, 0089_QC106_210608, 0089_MW124_210608, 0089_MW126_210608, 0089_MW123_210608, 0089_MW120_210608, 0089_MW117_210608, 0089_MW109_210608, 0089_MW125_210608, 0089_MW127_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW121_210608, 0089_QC102_210608, 0089_MW112_210608, 0089_QC106_210608, 0089_MW124_210608, 0089_MW126_210608, 0089_MW123_210608, 0089_MW120_210608, 0089_MW117_210608, 0089_MW109_210608, 0089_MW125_210608, 0089_MW127_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW121_210608, 0089_QC102_210608, 0089_MW112_210608, 0089_QC106_210608, 0089_MW124_210608, 0089_MW126_210608, 0089_MW123_210608, 0089_MW120_210608, 0089_MW117_210608, 0089_MW109_210608, 0089_MW125_210608, 0089_MW127_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW121_210608, 0089_QC102_210608, 0089_MW112_210608, 0089_QC106_210608, 0089_MW124_210608, 0089_MW126_210608, 0089_MW123_210608, 0089_MW120_210608, 0089_MW117_210608, 0089_MW109_210608, 0089_MW125_210608, 0089_MW127_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106448**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23821	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: MB DEF19009/Stirling GW		
Sampler	: [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 12:45	Issue Date	: 10-Jun-2021
Client Requested Due Date	: 21-Jun-2021	Scheduled Reporting Date	: **21-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106448-001	08-Jun-2021 08:49	0089_MW121_210608	✓	✓	✓	✓	✓	✓	✓
EP2106448-002	08-Jun-2021 09:13	0089_MW123_210608	✓	✓	✓	✓	✓	✓	✓
EP2106448-003	08-Jun-2021 09:16	0089_QC102_210608	✓	✓	✓	✓	✓	✓	✓
EP2106448-004	08-Jun-2021 09:31	0089_MW120_210608	✓	✓	✓	✓	✓	✓	✓
EP2106448-005	08-Jun-2021 09:47	0089_MW112_210608	✓	✓	✓	✓	✓	✓	✓
EP2106448-006	08-Jun-2021 10:16	0089_MW117_210608	✓	✓	✓	✓	✓	✓	✓
EP2106448-007	08-Jun-2021 10:17	0089_QC106_210608	✓	✓	✓	✓	✓	✓	✓
EP2106448-008	08-Jun-2021 10:37	0089_MW109_210608	✓	✓	✓	✓	✓	✓	✓
EP2106448-009	08-Jun-2021 11:16	0089_MW124_210608	✓	✓	✓	✓	✓	✓	✓
EP2106448-010	08-Jun-2021 11:27	0089_MW125_210608	✓	✓	✓	✓	✓	✓	✓
EP2106448-011	08-Jun-2021 11:40	0089_MW126_210608	✓	✓	✓	✓	✓	✓	✓
EP2106448-012	08-Jun-2021 11:51	0089_MW127_210608	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106448-001	08-Jun-2021 08:49	0089_MW121_210608	✓
EP2106448-002	08-Jun-2021 09:13	0089_MW123_210608	✓
EP2106448-003	08-Jun-2021 09:16	0089_QC102_210608	✓
EP2106448-004	08-Jun-2021 09:31	0089_MW120_210608	✓
EP2106448-005	08-Jun-2021 09:47	0089_MW112_210608	✓
EP2106448-006	08-Jun-2021 10:16	0089_MW117_210608	✓
EP2106448-007	08-Jun-2021 10:17	0089_QC106_210608	✓
EP2106448-008	08-Jun-2021 10:37	0089_MW109_210608	✓
EP2106448-009	08-Jun-2021 11:16	0089_MW124_210608	✓
EP2106448-010	08-Jun-2021 11:27	0089_MW125_210608	✓
EP2106448-011	08-Jun-2021 11:40	0089_MW126_210608	✓
EP2106448-012	08-Jun-2021 11:51	0089_MW127_210608	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
0089_MW109_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_MW112_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_MW117_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_MW120_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_MW121_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_MW123_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_MW124_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_MW125_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_MW126_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_MW127_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_QC102_210608	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_QC106_210608	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING Intelligence

Environmental Division
Perth
Work Order Reference
EP2106448

1301

Custody Document for Submissions via ALS Compass App

Project: WA-0089-PFASOMP **Client:** CARDNO **Project Manag** [redacted]

Phone:

ALS Compass COC Reference: ~~23850~~ ~~23817~~ 23829 23826 ~~23851~~ 23821 **# Samples:**

Sampler: [redacted]

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send QC2** (x10) to Eurofins

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
CARDNO	[redacted]		
Date / Time: 9/6/21	Date / Time: 9/6 1245	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: **23821** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW121		08/06/2021 08:49 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW123		08/06/2021 09:13 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		Extra PFAS bottles for lab QC
003	0089_QC102		08/06/2021 09:16 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_MW120		08/06/2021 09:31 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_MW112		08/06/2021 09:47 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_MW117		08/06/2021 10:16 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_QC106		08/06/2021 10:17 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_MW109		08/06/2021 10:37 AM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		extra PFAS bottles for lab QC
009	0089_MW124		08/06/2021 11:16 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

COC#: 23821 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW125		08/06/2021 11:27 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
011	0089_MW126		08/06/2021 11:40 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
012	0089_MW127		08/06/2021 11:51 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

(ALS) COC#: **23821** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW121	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW123	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_QC102	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW120	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW112	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23821 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW117	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_QC106	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW109	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_MW124	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_MW125	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_MW126	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23821 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

012	0089_MW127	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **23821** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW121	Clear Plastic Bottle - Natural	250 mL	00071020085301	Green	No	
001	0089_MW121	HDPE (no PTFE)	20 mL	00350019152415	Grey	No	
001	0089_MW121	HDPE (no PTFE)	20 mL	00350019152395	Grey	No	
001	0089_MW121	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019437	Purple	No	
002	0089_MW123	Amber TOC Vial - Sulfuric Acid	40 mL	00181020018794	Purple	No	
002	0089_MW123	Clear Plastic Bottle - Natural	250 mL	00071020085261	Green	No	
002	0089_MW123	HDPE (no PTFE)	20 mL	00350019163876	Grey	No	
002	0089_MW123	HDPE (no PTFE)	20 mL	00350019164279	Grey	No	
002	0089_MW123	HDPE (no PTFE)	20 mL	00350019152518	Grey	No	
002	0089_MW123	HDPE (no PTFE)	20 mL	00350019152401	Grey	No	
003	0089_QC102	Clear Plastic Bottle - Natural	250 mL	00071020085257	Green	No	
003	0089_QC102	HDPE (no PTFE)	20 mL	00350019152301	Grey	No	
003	0089_QC102	HDPE (no PTFE)	20 mL	00350019152343	Grey	No	
003	0089_QC102	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019387	Purple	No	
004	0089_MW120	Amber TOC Vial - Sulfuric Acid	40 mL	00181020018926	Purple	No	
004	0089_MW120	Clear Plastic Bottle - Natural	250 mL	00071020085274	Green	No	
004	0089_MW120	HDPE (no PTFE)	20 mL	00352010070747	Grey	No	
004	0089_MW120	HDPE (no PTFE)	20 mL	00352010070742	Grey	No	
005	0089_MW112	HDPE (no PTFE)	20 mL	00350019152281	Grey	No	
005	0089_MW112	HDPE (no PTFE)	20 mL	00350019152324	Grey	No	
005	0089_MW112	Amber TOC Vial - Sulfuric Acid	40 mL	00181020018753	Purple	No	
005	0089_MW112	Clear Plastic Bottle - Natural	250 mL	00071020085264	Green	No	
006	0089_MW117	Amber TOC Vial - Sulfuric Acid	40 mL	00181020018810	Purple	No	
006	0089_MW117	Clear Plastic Bottle - Natural	250 mL	00071020085289	Green	No	
006	0089_MW117	HDPE (no PTFE)	20 mL	00352010070676	Grey	No	
006	0089_MW117	HDPE (no PTFE)	20 mL	00352010070641	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 23821 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_QC106	Amber TOC Vial - Sulfuric Acid	40 mL	00181020018812	Purple	No	
007	0089_QC106	Clear Plastic Bottle - Natural	250 mL	00071020085265	Green	No	
007	0089_QC106	HDPE (no PTFE)	20 mL	00350019152347	Grey	No	
007	0089_QC106	HDPE (no PTFE)	20 mL	00350019152342	Grey	No	
008	0089_MW109	Clear Plastic Bottle - Natural	250 mL	00071018014766	Green	No	
008	0089_MW109	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019647	Purple	No	
008	0089_MW109	HDPE (no PTFE)	20 mL	00350019163901	Grey	No	
008	0089_MW109	HDPE (no PTFE)	20 mL	00350019163864	Grey	No	
008	0089_MW109	HDPE (no PTFE)	20 mL	00350019130929	Grey	No	
008	0089_MW109	HDPE (no PTFE)	20 mL	00350019130932	Grey	No	
009	0089_MW124	Clear Plastic Bottle - Natural	250 mL	00071018014764	Green	No	
009	0089_MW124	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019660	Purple	No	
009	0089_MW124	HDPE (no PTFE)	20 mL	00350019130885	Grey	No	
009	0089_MW124	HDPE (no PTFE)	20 mL	00350019151617	Grey	No	
010	0089_MW125	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019627	Purple	No	
010	0089_MW125	Clear Plastic Bottle - Natural	250 mL	00071018014760	Green	No	
010	0089_MW125	HDPE (no PTFE)	20 mL	00350019151419	Grey	No	
010	0089_MW125	HDPE (no PTFE)	20 mL	00350019151447	Grey	No	
011	0089_MW126	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019576	Purple	No	
011	0089_MW126	Clear Plastic Bottle - Natural	250 mL	00071018014803	Green	No	
011	0089_MW126	HDPE (no PTFE)	20 mL	00350019151647	Grey	No	
011	0089_MW126	HDPE (no PTFE)	20 mL	00350019151609	Grey	No	
012	0089_MW127	Clear Plastic Bottle - Natural	250 mL	00071018014800	Green	No	
012	0089_MW127	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019590	Purple	No	
012	0089_MW127	HDPE (no PTFE)	20 mL	00350019151387	Grey	No	
012	0089_MW127	HDPE (no PTFE)	20 mL	00350019151513	Grey	No	

Total Bottle Count: ALS: 52, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106449**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 12:45
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23850	Issue Date	: 18-Jun-2021 16:14
Sampler	: [redacted]		
Site	: MB DEF19009/Stirling SED		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD363_210608	0089_SD341_210608	0089_SD362_210608	0089_SD340_210608	----
			Sampling date / time	08-Jun-2021 12:08	08-Jun-2021 12:20	08-Jun-2021 13:10	08-Jun-2021 13:25	----
Compound	CAS Number	LOR	Unit	EP2106449-001	EP2106449-002	EP2106449-003	EP2106449-004	--------
				Result	Result	Result	Result	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.0**	**9.3**	**9.1**	**9.1**	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**35400**	**1440**	**30600**	**36600**	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**24.2**	**27.0**	**28.9**	**26.5**	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**5.2**	**5.6**	**4.0**	**4.0**	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.6**	**0.6**	**0.4**	**0.5**	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	----
Exchangeable Sodium	----	0.1	meq/100g	**0.1**	**0.1**	**0.1**	**0.1**	----
Cation Exchange Capacity	----	0.1	meq/100g	**6.0**	**6.3**	**4.6**	**4.6**	----
Exchangeable Sodium Percent	----	0.1	%	**2.1**	**2.1**	**2.2**	**2.3**	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	**0.6**	**1.0**	**0.6**	**1.2**	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD363_210608	0089_SD341_210608	0089_SD362_210608	0089_SD340_210608	----
				Sampling date / time	08-Jun-2021 12:08	08-Jun-2021 12:20	08-Jun-2021 13:10	08-Jun-2021 13:25	----
Compound	CAS Number	LOR	Unit		EP2106449-001	EP2106449-002	EP2106449-003	EP2106449-004	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD363_210608	0089_SD341_210608	0089_SD362_210608	0089_SD340_210608	----
			Sampling date / time	08-Jun-2021 12:08	08-Jun-2021 12:20	08-Jun-2021 13:10	08-Jun-2021 13:25	----
Compound	CAS Number	LOR	Unit	EP2106449-001	EP2106449-002	EP2106449-003	EP2106449-004	--------
				Result	Result	Result	Result	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**97.5**	**118**	**102**	**109**	----
13C8-PFOA	----	0.0002	%	**104**	**94.0**	**98.5**	**108**	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106449**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	[redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23850	Issue Date	: 18-Jun-2021
Sampler	: [redacted]		
Site	: MB DEF19009/Stirling SED		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3732248)									
EP2106449-001	0089_SD363_210608	EA002: pH Value	----	0.1	pH Unit	9.0	9.1	0.0	0% - 20%
EP2106466-006	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.0	9.1	0.0	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3732247)									
EP2106449-001	0089_SD363_210608	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	35400	35100	0.9	0% - 20%
EP2106466-006	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	41800	41700	0.2	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3733941)									
EP2106449-001	0089_SD363_210608	EA055: Moisture Content	----	0.1	%	24.2	26.2	7.8	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3732257)									
EP2106449-001	0089_SD363_210608	ED008: Exchangeable Sodium Percent	----	0.1	%	2.1	2.0	5.6	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	5.2	6.3	19.1	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.6	0.7	0.0	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.1	0.1	0.0	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	6.0	7.2	18.4	0% - 20%
EP2106466-006	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	2.4	2.6	7.2	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	3.4	3.2	4.3	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.4	0.0	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	3.8	3.7	3.9	0% - 20%
EP004: Organic Matter (QC Lot: 3733936)									
EP2106449-001	0089_SD363_210608	EP004: Organic Matter	----	0.5	%	0.6	0.7	21.8	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3740899)									
EP2106449-001	0089_SD363_210608	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3740899) - continued									
EP2106449-001	0089_SD363_210608	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2106466-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3740899)									
EP2106449-001	0089_SD363_210608	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2106466-007	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740899)									
EP2106449-001	0089_SD363_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740899) - continued									
EP2106449-001	0089_SD363_210608	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106466-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3740899)									
EP2106449-001	0089_SD363_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106466-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3732248)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	70.0	130
				----	7 pH Unit	99.1	70.0	130
EA010: Conductivity (1:5) (QCLot: 3732247)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	12890 µS/cm	99.3	93.6	106
ED008: Exchangeable Cations (QCLot: 3732257)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	88.5	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	85.5	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	98.3	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	92.9	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	88.8	79.9	110
EP004: Organic Matter (QCLot: 3733936)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	86.1	70.0	120
				<0.5	85 %	90.8	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740899)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.4	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740899)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	89.5	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.6	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	108	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740899)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740899) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	114	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	112	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.8	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740899)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	82.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	92.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	101	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	113	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740899)							
EP2106449-001	0089_SD363_210608	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	88.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	95.6	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	85.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	91.6	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	86.8	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	82.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740899)							
EP2106449-001	0089_SD363_210608	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	92.6	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	94.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	109	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	99.2	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	109	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	111	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740899) - continued							
EP2106449-001	0089_SD363_210608	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	100	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	89.6	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	108	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740899)							
EP2106449-001	0089_SD363_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	101	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	112	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	114	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	112	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	102	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	94.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	97.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740899)							
EP2106449-001	0089_SD363_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	91.6	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	88.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	99.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	109	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106449**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: MB DEF19009/Stirling SED	Issue Date	: 18-Jun-2021
Sampler	: [redacted]	No. of samples received	: 4
Order number	: DEF19009/730	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD363_210608, 0089_SD341_210608, 0089_SD362_210608, 0089_SD340_210608	**08-Jun-2021**	**14-Jun-2021**	15-Jun-2021	✓	**14-Jun-2021**	14-Jun-2021	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD363_210608, 0089_SD341_210608, 0089_SD362_210608, 0089_SD340_210608	**08-Jun-2021**	**14-Jun-2021**	15-Jun-2021	✓	**14-Jun-2021**	12-Jul-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD363_210608, 0089_SD341_210608, 0089_SD362_210608, 0089_SD340_210608	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	22-Jun-2021	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD363_210608, 0089_SD341_210608, 0089_SD362_210608, 0089_SD340_210608	**08-Jun-2021**	**15-Jun-2021**	06-Jul-2021	✓	**15-Jun-2021**	06-Jul-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD363_210608, 0089_SD341_210608, 0089_SD362_210608, 0089_SD340_210608	**08-Jun-2021**	**15-Jun-2021**	06-Jul-2021	✓	**15-Jun-2021**	06-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD363_210608, 0089_SD341_210608, 0089_SD362_210608, 0089_SD340_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD363_210608, 0089_SD341_210608, 0089_SD362_210608, 0089_SD340_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD363_210608, 0089_SD341_210608, 0089_SD362_210608, 0089_SD340_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD363_210608, 0089_SD341_210608, 0089_SD362_210608, 0089_SD340_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD363_210608, 0089_SD341_210608, 0089_SD362_210608, 0089_SD340_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	4	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106449**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23850	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: MB DEF19009/Stirling SED		
Sampler	: [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 12:45	Issue Date	: 10-Jun-2021
Client Requested Due Date	: 21-Jun-2021	Scheduled Reporting Date	: **21-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2106449-001	08-Jun-2021 12:08	0089_SD363_210608	✓	✓	✓	✓
EP2106449-002	08-Jun-2021 12:20	0089_SD341_210608	✓	✓	✓	✓
EP2106449-003	08-Jun-2021 13:10	0089_SD362_210608	✓	✓	✓	✓
EP2106449-004	08-Jun-2021 13:25	0089_SD340_210608	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2106449

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0089_PFASONP **Client:** CARDNO **Project Manager:** [redacted]

ALS Compass COC Reference: 23850 23817 23829 23826 23851 23821 **# Samples:** _____ **Sampler:** [redacted]

Phone:) **Phone:**)

Turnaround Requirements: Standard √ Urgent _____

Special Instructions:

Please send QC2** (x10) to Eurofins

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
CARDNO	[redacted]		
Date / Time: 9/6/21	Date / Time: 9/6 1245	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: **23850** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD363		08/06/2021 12:08 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD341		08/06/2021 12:20 PM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD362		08/06/2021 01:10 PM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD340		08/06/2021 01:25 PM	Soil	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

COC#: **23850** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD363	Soil Glass Jar - Unpreserved	150 mL	00261020040599	Orange	No	
001	0089_SD363	HDPE Soil Jar	200 mL	00620719063039	Grey	No	
002	0089_SD341	HDPE Soil Jar	200 mL	00620719085978	Grey	No	
002	0089_SD341	Soil Glass Jar - Unpreserved	150 mL	00260121056907	Orange	No	
003	0089_SD362	Soil Glass Jar - Unpreserved	150 mL	00260121056817	Orange	No	
003	0089_SD362	HDPE Soil Jar	200 mL	00620719085720	Grey	No	
004	0089_SD340	Soil Glass Jar - Unpreserved	150 mL	00260121045312	Orange	No	
004	0089_SD340	HDPE Soil Jar	200 mL	00620719057232	Grey	No	

Total Bottle Count: ALS: 8, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106450**	Page	: 1 of 15
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 12:45
Order number	: DEF19009/730	Date Analysis Commenced	: 11-Jun-2021
C-O-C number	: 23851	Issue Date	: 22-Jun-2021 12:16
Sampler	: [redacted]		
Site	: MB DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 16		
No. of samples analysed	: 16		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231X: PFAS results for sample #5, #6 confirmed by re-extraction and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW363_210608	0089_SW134_210608	0089_QC110_210608	0089_SW353_210608	0089_SW384_210608
				Sampling date / time	08-Jun-2021 12:08	08-Jun-2021 12:49	08-Jun-2021 12:51	08-Jun-2021 15:42	08-Jun-2021 15:45
Compound	CAS Number	LOR	Unit		EP2106450-001	EP2106450-003	EP2106450-004	EP2106450-007	EP2106450-008
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.64	7.81	7.82	8.08	8.09
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		39100	37000	38900	39400	40200
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		60	467	286	18	24
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		120	116	117	104	113
Total Alkalinity as CaCO3	----	1	mg/L		120	116	117	104	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2810	2780	2790	2800	2770
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17800	17800	18100	17900	17800
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		461	467	462	458	454
Magnesium	7439-95-4	1	mg/L		1460	1500	1490	1480	1460
Sodium	7440-23-5	1	mg/L		11400	11800	11700	11600	11400
Potassium	7440-09-7	1	mg/L		602	626	626	618	608
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		563	562	571	565	562
ø Total Cations	----	0.01	meq/L		654	676	671	665	654
ø Ionic Balance	----	0.01	%		7.51	9.18	8.02	8.10	7.58
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		4	4	4	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW363_210608	0089_SW134_210608	0089_QC110_210608	0089_SW353_210608	0089_SW384_210608
				Sampling date / time	08-Jun-2021 12:08	08-Jun-2021 12:49	08-Jun-2021 12:51	08-Jun-2021 15:42	08-Jun-2021 15:45
Compound	CAS Number	LOR	Unit		EP2106450-001	EP2106450-003	EP2106450-004	EP2106450-007	EP2106450-008
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW363_210608	0089_SW134_210608	0089_QC110_210608	0089_SW353_210608	0089_SW384_210608
				Sampling date / time	08-Jun-2021 12:08	08-Jun-2021 12:49	08-Jun-2021 12:51	08-Jun-2021 15:42	08-Jun-2021 15:45
Compound	CAS Number	LOR	Unit		EP2106450-001	EP2106450-003	EP2106450-004	EP2106450-007	EP2106450-008
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**108**	**105**	**104**	**102**	**103**
13C8-PFOA	----	0.02	%		**102**	**99.4**	**101**	**104**	**102**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW383_210608	0089_SW382_210608	----	----	----
			Sampling date / time	08-Jun-2021 15:46	08-Jun-2021 15:47	----	----	----
Compound	CAS Number	LOR	Unit	EP2106450-009	EP2106450-010	--------	--------	--------
				Result	Result	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**8.11**	**8.09**	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**40900**	**40400**	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**39**	**20**	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**114**	**114**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**114**	**114**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**2810**	**2810**	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**18000**	**18000**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**468**	**458**	----	----	----
Magnesium	7439-95-4	1	mg/L	**1500**	**1480**	----	----	----
Sodium	7440-23-5	1	mg/L	**11700**	**11700**	----	----	----
Potassium	7440-09-7	1	mg/L	**623**	**619**	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**568**	**568**	----	----	----
ø Total Cations	----	0.01	meq/L	**672**	**669**	----	----	----
ø Ionic Balance	----	0.01	%	**8.31**	**8.15**	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**1**	<1	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW383_210608	0089_SW382_210608	----	----	----
			Sampling date / time	08-Jun-2021 15:46	08-Jun-2021 15:47	----	----	----
Compound	CAS Number	LOR	Unit	EP2106450-009	EP2106450-010	--------	--------	--------
				Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW383_210608	0089_SW382_210608	----	----	----
				Sampling date / time	08-Jun-2021 15:46	08-Jun-2021 15:47	----	----	----
Compound	CAS Number	LOR	Unit		EP2106450-009	EP2106450-010	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**113**	----	----	----
13C8-PFOA	----	0.02	%		**101**	**102**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0089_PW341_210608	0089_PW362_210608	0089_PW340_210608	0089_PW380_210608	0089_PW351_210608
			Sampling date / time	08-Jun-2021 12:23	08-Jun-2021 13:11	08-Jun-2021 13:23	08-Jun-2021 15:51	08-Jun-2021 15:53
Compound	CAS Number	LOR	Unit	EP2106450-002	EP2106450-005	EP2106450-006	EP2106450-011	EP2106450-012
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.68	7.75	7.70	7.65	7.96
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	39000	37700	38900	42300	42200
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	89	118	92	88	61
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	123	128	111	120	105
Total Alkalinity as CaCO3	----	1	mg/L	123	128	111	120	105
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2780	2720	2670	2640	2790
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	17800	17700	17200	18800	18000
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	463	448	449	466	459
Magnesium	7439-95-4	1	mg/L	1470	1430	1440	1480	1470
Sodium	7440-23-5	1	mg/L	11500	11200	11300	11400	11500
Potassium	7440-09-7	1	mg/L	607	590	598	630	613
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	562	558	543	588	568
ø Total Cations	----	0.01	meq/L	660	642	648	657	660
ø Ionic Balance	----	0.01	%	7.97	6.98	8.80	5.57	7.48
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	6	3	4	1	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW341_210608	0089_PW362_210608	0089_PW340_210608	0089_PW380_210608	0089_PW351_210608
				Sampling date / time	08-Jun-2021 12:23	08-Jun-2021 13:11	08-Jun-2021 13:23	08-Jun-2021 15:51	08-Jun-2021 15:53
Compound	CAS Number	LOR	Unit		EP2106450-002	EP2106450-005	EP2106450-006	EP2106450-011	EP2106450-012
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.01**	**0.02**	<0.01	**0.01**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW341_210608	0089_PW362_210608	0089_PW340_210608	0089_PW380_210608	0089_PW351_210608
				Sampling date / time	08-Jun-2021 12:23	08-Jun-2021 13:11	08-Jun-2021 13:23	08-Jun-2021 15:51	08-Jun-2021 15:53
Compound	CAS Number	LOR	Unit		EP2106450-002	EP2106450-005	EP2106450-006	EP2106450-011	EP2106450-012
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.01**	**0.02**	<0.01	**0.01**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.01**	**0.02**	<0.01	**0.01**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.01**	**0.02**	<0.01	**0.01**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.2**	**114**	**106**	**103**	**111**
13C8-PFOA	----	0.02	%		**99.5**	**110**	**102**	**99.1**	**101**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0089_PW381_210608	0089_PW352_210608	0089_PW401_210608	0089_PW350_210608	----
			Sampling date / time	08-Jun-2021 15:56	08-Jun-2021 15:59	08-Jun-2021 16:02	08-Jun-2021 16:04	----
Compound	CAS Number	LOR	Unit	EP2106450-013	EP2106450-014	EP2106450-015	EP2106450-016	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.09	8.01	8.04	7.83	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	42000	41400	42800	42700	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	31	26	152	198	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	115	116	116	114	----
Total Alkalinity as CaCO3	----	1	mg/L	115	116	116	114	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2780	2770	2760	2730	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18000	18000	18200	18000	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	458	469	450	462	----
Magnesium	7439-95-4	1	mg/L	1470	1500	1450	1480	----
Sodium	7440-23-5	1	mg/L	11500	11800	11400	11700	----
Potassium	7440-09-7	1	mg/L	613	620	598	622	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	568	568	573	567	----
ø Total Cations	----	0.01	meq/L	660	676	653	670	----
ø Ionic Balance	----	0.01	%	7.48	8.70	6.51	8.31	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	2	1	2	<1	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW381_210608	0089_PW352_210608	0089_PW401_210608	0089_PW350_210608	----
				Sampling date / time	08-Jun-2021 15:56	08-Jun-2021 15:59	08-Jun-2021 16:02	08-Jun-2021 16:04	----
Compound	CAS Number	LOR	Unit		EP2106450-013	EP2106450-014	EP2106450-015	EP2106450-016	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.01**	<0.01	**0.03**	**0.01**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW381_210608	0089_PW352_210608	0089_PW401_210608	0089_PW350_210608	----
				Sampling date / time	08-Jun-2021 15:56	08-Jun-2021 15:59	08-Jun-2021 16:02	08-Jun-2021 16:04	----
Compound	CAS Number	LOR	Unit		EP2106450-013	EP2106450-014	EP2106450-015	EP2106450-016	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.01**	<0.01	**0.03**	**0.01**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.01**	<0.01	**0.03**	**0.01**	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.01**	<0.01	**0.03**	**0.01**	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**108**	**110**	**107**	**100**	----
13C8-PFOA	----	0.02	%		**99.0**	**101**	**93.8**	**96.0**	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106450**	Page	: 1 of 17
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 11-Jun-2021
C-O-C number	: 23851	Issue Date	: 22-Jun-2021
Sampler	: [redacted]		
Site	: MB DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 16		
No. of samples analysed	: 16		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3741436)									
EP2106450-002	0089_PW341_210608	EA005-P: pH Value	----	0.01	pH Unit	7.68	7.59	1.2	0% - 20%
EP2106450-011	0089_PW380_210608	EA005-P: pH Value	----	0.01	pH Unit	7.65	7.67	0.3	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3731862)									
EP2106450-009	0089_SW383_210608	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	40900	40200	1.8	0% - 20%
EP2106450-001	0089_PW363_210608	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	39100	38700	1.0	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3733890)									
EP2106448-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	476	449	5.8	0% - 20%
EP2106448-009	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	33000	32500	1.3	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3731863)									
EP2106476-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
EP2106450-001	0089_PW363_210608	EA025H: Suspended Solids (SS)	----	5	mg/L	60	66	9.1	0% - 50%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3733891)									
EP2106448-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	59	56	4.3	0% - 50%
EP2106448-011	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	64	74	14.9	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3741435)									
EP2106450-002	0089_PW341_210608	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	123	118	4.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	123	118	4.4	0% - 20%
EP2106450-011	0089_PW380_210608	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	120	122	1.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	120	122	1.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3729885)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3729885) - continued									
EP2106450-001	0089_PW363_210608	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2810	2760	2.1	0% - 20%
EP2106450-011	0089_PW380_210608	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2640	2630	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3729886)									
EP2106450-001	0089_PW363_210608	ED045G: Chloride	16887-00-6	1	mg/L	17800	17700	0.8	0% - 20%
EP2106450-011	0089_PW380_210608	ED045G: Chloride	16887-00-6	1	mg/L	18800	18800	0.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3731468)									
EP2106450-001	0089_PW363_210608	ED093F: Calcium	7440-70-2	1	mg/L	461	457	0.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1460	1450	0.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11400	11400	0.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	602	597	0.7	0% - 20%
EP2106450-011	0089_PW380_210608	ED093F: Calcium	7440-70-2	1	mg/L	466	473	1.4	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1480	1500	0.9	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11400	11500	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	630	633	0.4	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3734545)									
EP2106450-001	0089_PW363_210608	EP005: Total Organic Carbon	----	1	mg/L	4	3	0.0	No Limit
EP2106450-011	0089_PW380_210608	EP005: Total Organic Carbon	----	1	mg/L	1	<1	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3740653)									
EP2106448-002	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.07	0.07	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.16	0.17	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.13	0.12	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.68	0.61	11.6	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2106450-005	0089_PW362_210608	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.01	0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3741074)									
EB2115877-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.10	0.09	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.24	0.25	4.2	0% - 50%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EB2115877-006	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.07	0.08	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.08	0.08	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3741074) - continued									
EB2115877-006	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.06	0.06	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.65	0.68	4.6	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3742143)									
EP2106465-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2106465-008	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3740653)									
EP2106448-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.14	0.13	8.2	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.62	0.56	11.1	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2106450-005	0089_PW362_210608	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3741074)									
EB2115877-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EB2115877-006	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3742143)									
EP2106465-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2106465-008	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3742143) - continued									
EP2106465-008	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740653)									
EP2106448-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106450-005	0089_PW362_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3741074)									
EB2115877-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3741074) - continued									
EB2115877-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EB2115877-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3742143)									
EP2106465-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106465-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3742143) - continued									
EP2106465-008	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3740653)									
EP2106448-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106450-005	0089_PW362_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3741074)									
EB2115877-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EB2115877-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3742143)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3742143) - continued									
EP2106465-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106465-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3740653)									
EP2106448-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.82	1.68	8.0	0% - 20%
EP2106450-005	0089_PW362_210608	EP231X: Sum of PFAS	----	0.01	µg/L	0.01	0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3741074)									
EB2115877-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.38	0.36	5.4	0% - 20%
EB2115877-006	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.88	0.90	2.2	0% - 20%
EP231P: PFAS Sums (QC Lot: 3742143)									
EP2106465-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2106465-008	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3741436)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3731862)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	100	88.1	114
				<10	1000 mg/L	104	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3733890)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	105	88.1	114
				<10	1000 mg/L	103	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3731863)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	105	89.1	120
				<5	1000 mg/L	102	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3733891)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	103	89.1	120
				<5	1000 mg/L	102	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3741435)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	96.6	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729885)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.2	87.7	113
				<1	500 mg/L	105	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3729886)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.8	87.9	114
				<1	1000 mg/L	97.7	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3731468)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	104	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.9	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.4	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3734545)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 3734545) - continued								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	99.3	87.2	116
				<1	100 mg/L	106	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740653)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	111	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	86.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	106	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	67.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3741074)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	114	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	112	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	116	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	113	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	117	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3742143)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	97.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	105	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	99.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	102	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	108	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740653)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	98.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	# 0.02	0.25 µg/L	110	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	114	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	116	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	121	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	98.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	103	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3741074)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	108	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	117	72.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3741074) - continued								
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	117	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	120	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	128	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	124	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	109	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	114	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	127	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	113	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	119	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3742143)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	101	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	112	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	112	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	121	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	109	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	115	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740653)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	122	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	104	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	112	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	106	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	125	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	109	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3741074)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	110	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	120	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	98.0	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	115	66.0	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3741074) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	127	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	122	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	127	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3742143)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	96.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	112	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	111	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	109	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	103	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	125	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	126	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740653)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	108	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	117	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	96.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	95.8	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3741074)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	127	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	122	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	124	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	118	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3742143)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	101	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	111	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	124	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	109	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729885)							
EP2106450-001	0089_PW363_210608	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3729886)							
EP2106450-001	0089_PW363_210608	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3734545)							
EP2106450-002	0089_PW341_210608	EP005: Total Organic Carbon	----	100 mg/L	104	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740653)							
EP2106448-008	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	# Not Determined	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	# Not Determined	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	# Not Determined	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	# Not Determined	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	# Not Determined	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	# 145	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3741074)							
EB2115877-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	115	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	90.5	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	97.9	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	109	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	110	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	113	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3742143)							
EP2106465-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	111	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	125	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	106	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	126	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	122	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	121	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740653)							
EP2106448-008	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	# 71.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	# Not Determined	72.0	129

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740653) - continued							
EP2106448-008	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	# Not Determined	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	# Not Determined	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	99.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	97.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	108	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	106	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	90.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	95.3	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3741074)							
EB2115877-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	103	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	127	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	117	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	120	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	122	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	110	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	105	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	110	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	130	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	115	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	112	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3742143)							
EP2106465-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	108	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	117	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	120	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	122	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	127	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	126	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	127	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	128	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	119	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	117	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	122	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740653)							
EP2106448-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	67.0	137

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740653) - continued							
EP2106448-008	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	112	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	100	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	92.2	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	109	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	115	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	103	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3741074)							
EB2115877-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	113	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	113	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	91.3	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	117	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	116	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	121	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	117	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3742143)							
EP2106465-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	120	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	115	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	124	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	121	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	129	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	128	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	120	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740653)							
EP2106448-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	108	63.0	143

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740653) - continued							
EP2106448-008	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	67.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	84.6	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	99.8	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3741074)							
EB2115877-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	115	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	117	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	116	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	108	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3742143)							
EP2106465-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	121	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	128	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	124	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	122	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106450**	Page	: 1 of 10
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: MB DEF19009/Stirling SW/PW	Issue Date	: 22-Jun-2021
Sampler	: [redacted]	No. of samples received	: 16
Order number	: DEF19009/730	No. of samples analysed	: 16

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Method Blank value outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Method Blank (MB) Values							
EP231B: Perfluoroalkyl Carboxylic Acids	QC-3740653-001	----	**Perfluorohexanoic acid (PFHxA)**	307-24-4	0.02 µg/L	0.02 µg/L	**Blank result exceeds permitted value**
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2106450--001	0089_PW363_210608	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2106450--001	0089_PW363_210608	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2106448--008	Anonymous	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2106448--008	Anonymous	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2106448--008	Anonymous	**Perfluoroheptane sulfonic acid (PFHpS)**	375-92-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2106448--008	Anonymous	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2106448--008	Anonymous	**Perfluorodecane sulfonic acid (PFDS)**	335-77-3	145 %	53.0-142%	**Recovery greater than upper data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2106448--008	Anonymous	**Perfluorobutanoic acid (PFBA)**	375-22-4	71.8 %	73.0-129%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2106448--008	Anonymous	**Perfluorohexanoic acid (PFHxA)**	307-24-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2106448--008	Anonymous	**Perfluorooctanoic acid (PFOA)**	335-67-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)	*Date extracted*	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EA005P: pH by PC Titrator						

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator - Analysis Holding Time Compliance							
Clear Plastic Bottle - Natural							
0089_PW363_210608,	0089_PW341_210608,	----	----	----	17-Jun-2021	08-Jun-2021	**9**
0089_SW134_210608,	0089_QC110_210608,						
0089_PW362_210608,	0089_PW340_210608,						
0089_SW353_210608,	0089_SW384_210608,						
0089_SW383_210608,	0089_SW382_210608,						
0089_PW380_210608,	0089_PW351_210608,						
0089_PW381_210608,	0089_PW352_210608,						
0089_PW401_210608,	0089_PW350_210608						

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_PW363_210608,	0089_PW341_210608,	**08-Jun-2021**	**----**	----	----	**17-Jun-2021**	08-Jun-2021	✘
0089_SW134_210608,	0089_QC110_210608,							
0089_PW362_210608,	0089_PW340_210608,							
0089_SW353_210608,	0089_SW384_210608,							
0089_SW383_210608,	0089_SW382_210608,							
0089_PW380_210608,	0089_PW351_210608,							
0089_PW381_210608,	0089_PW352_210608,							
0089_PW401_210608,	0089_PW350_210608							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608, 0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608	**08-Jun-2021**	**----**	----	----	**11-Jun-2021**	15-Jun-2021	✓
Clear Plastic Bottle - Natural (EA015H)							
0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608, 0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	15-Jun-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608, 0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608	**08-Jun-2021**	**----**	----	----	**11-Jun-2021**	15-Jun-2021	✓
Clear Plastic Bottle - Natural (EA025H)							
0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608, 0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	15-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608, 0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608, 0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608, 0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**----**	----	----	**17-Jun-2021**	22-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608, 0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608, 0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608, 0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**----**	----	----	**21-Jun-2021**	06-Jul-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608, 0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608, 0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608, 0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**----**	----	----	**21-Jun-2021**	06-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608, 0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608, 0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608, 0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	15-Jun-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608, 0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608, 0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608, 0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	06-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608, 0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	05-Dec-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) 0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608, 0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	05-Dec-2021	✓
HDPE (no PTFE) (EP231X) 0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
HDPE (no PTFE) (EP231X) 0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) 0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608, 0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	05-Dec-2021	✓
HDPE (no PTFE) (EP231X) 0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
HDPE (no PTFE) (EP231X) 0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608, 0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	05-Dec-2021	✓
HDPE (no PTFE) (EP231X) 0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
HDPE (no PTFE) (EP231X) 0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW384_210608, 0089_SW383_210608, 0089_SW382_210608, 0089_PW380_210608, 0089_PW351_210608, 0089_PW381_210608, 0089_PW352_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	05-Dec-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW363_210608, 0089_PW341_210608, 0089_SW134_210608, 0089_QC110_210608, 0089_PW362_210608, 0089_PW340_210608, 0089_SW353_210608	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
HDPE (no PTFE) (EP231X)							
0089_PW401_210608, 0089_PW350_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	6	56	**10.71**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	34	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	56	**5.36**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	34	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	56	**5.36**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	34	**5.88**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	56	**5.36**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106450**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 4
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23851	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: MB DEF19009/Stirling SW/PW		
Sampler	: [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 12:45	Issue Date	: 10-Jun-2021
Client Requested Due Date	: 21-Jun-2021	Scheduled Reporting Date	: **21-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.2
Receipt Detail	:	No. of samples received / analysed	: 16 / 16

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106450-001	08-Jun-2021 12:08	0089_PW363_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-002	08-Jun-2021 12:23	0089_PW341_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-003	08-Jun-2021 12:49	0089_SW134_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-004	08-Jun-2021 12:51	0089_QC110_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-005	08-Jun-2021 13:11	0089_PW362_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-006	08-Jun-2021 13:23	0089_PW340_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-007	08-Jun-2021 15:42	0089_SW353_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-008	08-Jun-2021 15:45	0089_SW384_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-009	08-Jun-2021 15:46	0089_SW383_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-010	08-Jun-2021 15:47	0089_SW382_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-011	08-Jun-2021 15:51	0089_PW380_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-012	08-Jun-2021 15:53	0089_PW351_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-013	08-Jun-2021 15:56	0089_PW381_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-014	08-Jun-2021 15:59	0089_PW352_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-015	08-Jun-2021 16:02	0089_PW401_210608	✓	✓	✓	✓	✓	✓	✓
EP2106450-016	08-Jun-2021 16:04	0089_PW350_210608	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106450-001	08-Jun-2021 12:08	0089_PW363_210608	✓
EP2106450-002	08-Jun-2021 12:23	0089_PW341_210608	✓
EP2106450-003	08-Jun-2021 12:49	0089_SW134_210608	✓
EP2106450-004	08-Jun-2021 12:51	0089_QC110_210608	✓
EP2106450-005	08-Jun-2021 13:11	0089_PW362_210608	✓
EP2106450-006	08-Jun-2021 13:23	0089_PW340_210608	✓
EP2106450-007	08-Jun-2021 15:42	0089_SW353_210608	✓
EP2106450-008	08-Jun-2021 15:45	0089_SW384_210608	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106450-009	08-Jun-2021 15:46	0089_SW383_210608	✓
EP2106450-010	08-Jun-2021 15:47	0089_SW382_210608	✓
EP2106450-011	08-Jun-2021 15:51	0089_PW380_210608	✓
EP2106450-012	08-Jun-2021 15:53	0089_PW351_210608	✓
EP2106450-013	08-Jun-2021 15:56	0089_PW381_210608	✓
EP2106450-014	08-Jun-2021 15:59	0089_PW352_210608	✓
EP2106450-015	08-Jun-2021 16:02	0089_PW401_210608	✓
EP2106450-016	08-Jun-2021 16:04	0089_PW350_210608	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
0089_PW340_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW341_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW350_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW351_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW352_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW362_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW363_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW380_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW381_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW401_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_QC110_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_SW134_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_SW353_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_SW382_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_SW383_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_SW384_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----

Requested Deliverables

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2106450

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0089_PFASOTP **Client:** CARDNO **Project Manage** [redacted]

Phone:

ALS Compass COC Reference: ~~23850~~ 23851 23817 23829 23826 23821 **# Samples:**

Sampler:

Phone:

Turnaround Requirements: Standard √ Urgent

Special Instructions:

Please send QC2** (x10) to Eurofins

Custody:

Relinquished by:	Rece [redacted]	Relinquished by:	Received by:
Date / Time: 9/6/21	Date / Time: 9/6 1245	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: **23851** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW363		08/06/2021 12:08 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW341		08/06/2021 12:23 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_SW134		08/06/2021 12:49 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
004	0089_QC110		08/06/2021 12:51 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
005	0089_PW362		08/06/2021 01:11 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		extra PFAS bottles for lab QC
006	0089_PW340		08/06/2021 01:23 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_SW353		08/06/2021 03:42 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		extra PFAS bottles for lab QC
008	0089_SW384		08/06/2021 03:45 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
009	0089_SW383		08/06/2021 03:46 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

COC#: 23851 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SW382		08/06/2021 03:47 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		extra PFAS bottles for lab QC
011	0089_PW380		08/06/2021 03:51 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
012	0089_PW351		08/06/2021 03:53 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
013	0089_PW381		08/06/2021 03:56 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
014	0089_PW352		08/06/2021 03:59 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
015	0089_PW401		08/06/2021 04:02 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
016	0089_PW350		08/06/2021 04:04 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		extra pfas bottles for lab QC

CHAIN OF CUSTODY

COC#: **23851** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW363	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW341	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_SW134	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_QC110	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_PW362	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **23851** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW340	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_SW353	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_SW384	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_SW383	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_SW382	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_PW380	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **23851** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

012	0089_PW351	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
013	0089_PW381	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
014	0089_PW352	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
015	0089_PW401	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
016	0089_PW350	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 23851 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW363	Clear Plastic Bottle - Natural	250 mL	00071018014744	Green	No	
001	0089_PW363	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019613	Purple	No	
001	0089_PW363	HDPE (no PTFE)	20 mL	00350019130875	Grey	No	
001	0089_PW363	HDPE (no PTFE)	20 mL	00350019130810	Grey	No	
002	0089_PW341	HDPE (no PTFE)	20 mL	00350019151406	Grey	No	
002	0089_PW341	HDPE (no PTFE)	20 mL	00350019151550	Grey	No	
002	0089_PW341	Clear Plastic Bottle - Natural	250 mL	00071018014773	Green	No	
002	0089_PW341	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019626	Purple	No	
003	0089_SW134	Clear Plastic Bottle - Natural	250 mL	00071018014782	Green	No	
003	0089_SW134	HDPE (no PTFE)	20 mL	00350019151536	Grey	No	
003	0089_SW134	HDPE (no PTFE)	20 mL	00350019151509	Grey	No	
003	0089_SW134	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019630	Purple	No	
004	0089_QC110	Clear Plastic Bottle - Natural	250 mL	00071018014774	Green	No	
004	0089_QC110	HDPE (no PTFE)	20 mL	00350019151517	Grey	No	
004	0089_QC110	HDPE (no PTFE)	20 mL	00350019151435	Grey	No	
004	0089_QC110	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019386	Purple	No	
005	0089_PW362	Clear Plastic Bottle - Natural	250 mL	00071018014767	Green	No	
005	0089_PW362	HDPE (no PTFE)	20 mL	00350019164369	Grey	No	
005	0089_PW362	HDPE (no PTFE)	20 mL	00350019164434	Grey	No	
005	0089_PW362	HDPE (no PTFE)	20 mL	00350019151619	Grey	No	
005	0089_PW362	HDPE (no PTFE)	20 mL	00350019151627	Grey	No	
005	0089_PW362	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019604	Purple	No	
006	0089_PW340	Clear Plastic Bottle - Natural	250 mL	00071018014776	Green	No	
006	0089_PW340	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019584	Purple	No	
006	0089_PW340	HDPE (no PTFE)	20 mL	00350019151655	Grey	No	
006	0089_PW340	HDPE (no PTFE)	20 mL	00350019151459	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: 23851 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_SW353	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001191	Purple	No	
007	0089_SW353	Clear Plastic Bottle - Natural	250 mL	00071018014845	Green	No	
007	0089_SW353	HDPE (no PTFE)	20 mL	00350019164070	Grey	No	
007	0089_SW353	HDPE (no PTFE)	20 mL	00350019164283	Grey	No	
007	0089_SW353	HDPE (no PTFE)	20 mL	00350019102624	Grey	No	
007	0089_SW353	HDPE (no PTFE)	20 mL	00350019126768	Grey	No	
008	0089_SW384	Clear Plastic Bottle - Natural	250 mL	00071018014865	Green	No	
008	0089_SW384	HDPE (no PTFE)	20 mL	00350019164419	Grey	No	
008	0089_SW384	HDPE (no PTFE)	20 mL	00350019126987	Grey	No	
008	0089_SW384	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001232	Purple	No	
009	0089_SW383	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001183	Purple	No	
009	0089_SW383	HDPE (no PTFE)	20 mL	00350019126983	Grey	No	
009	0089_SW383	HDPE (no PTFE)	20 mL	00350019102612	Grey	No	
009	0089_SW383	Clear Plastic Bottle - Natural	250 mL	00071018014851	Green	No	
010	0089_SW382	Clear Plastic Bottle - Natural	250 mL	00071018014817	Green	No	
010	0089_SW382	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001158	Purple	No	
010	0089_SW382	HDPE (no PTFE)	20 mL	00350019164136	Grey	No	
010	0089_SW382	HDPE (no PTFE)	20 mL	00350019126878	Grey	No	
010	0089_SW382	HDPE (no PTFE)	20 mL	00350019164188	Grey	No	
010	0089_SW382	HDPE (no PTFE)	20 mL	00350019164139	Grey	No	
011	0089_PW380	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019349	Purple	No	
011	0089_PW380	HDPE (no PTFE)	20 mL	00350019130942	Grey	No	
011	0089_PW380	HDPE (no PTFE)	20 mL	00350019130816	Grey	No	
011	0089_PW380	Clear Plastic Bottle - Natural	250 mL	00071018014763	Green	No	
012	0089_PW351	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019623	Purple	No	
012	0089_PW351	HDPE (no PTFE)	20 mL	00350019130747	Grey	No	
012	0089_PW351	HDPE (no PTFE)	20 mL	00350019151421	Grey	No	

CHAIN OF CUSTODY

COC#: **23851** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

012	0089_PW351	Clear Plastic Bottle - Natural	250 mL	00071018014749	Green	No	
013	0089_PW381	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019552	Purple	No	
013	0089_PW381	HDPE (no PTFE)	20 mL	00350019151581	Grey	No	
013	0089_PW381	HDPE (no PTFE)	20 mL	00350019151383	Grey	No	
013	0089_PW381	Clear Plastic Bottle - Natural	250 mL	00071018014755	Green	No	
014	0089_PW352	Clear Plastic Bottle - Natural	250 mL	00071018014861	Green	No	
014	0089_PW352	HDPE (no PTFE)	20 mL	00350019102591	Grey	No	
014	0089_PW352	HDPE (no PTFE)	20 mL	00350019163932	Grey	No	
014	0089_PW352	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001159	Purple	No	
015	0089_PW401	Clear Plastic Bottle - Natural	250 mL	00071018014772	Green	No	
015	0089_PW401	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019646	Purple	No	
015	0089_PW401	HDPE (no PTFE)	20 mL	00350019151644	Grey	No	
015	0089_PW401	HDPE (no PTFE)	20 mL	00350019151371	Grey	No	
016	0089_PW350	Clear Plastic Bottle - Natural	250 mL	00071018014831	Green	No	
016	0089_PW350	HDPE (no PTFE)	20 mL	00350019164240	Grey	No	
016	0089_PW350	HDPE (no PTFE)	20 mL	00350019164147	Grey	No	
016	0089_PW350	HDPE (no PTFE)	20 mL	00350019164055	Grey	No	
016	0089_PW350	HDPE (no PTFE)	20 mL	00350019127022	Grey	No	
016	0089_PW350	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001213	Purple	No	

Total Bottle Count: ALS: 72, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106464**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 12:45
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23817	Issue Date	: 24-Jun-2021 09:32
Sampler	: [redacted], [redacted]		
Site	: AH DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- **The pairs of green labelled plastic containers provided for sample 1 and 2 had large variations in the results for TDS, Anions and Cations analysis. This was due to visible differences in the matrix between the pairs of containers provided at the same location. As such ALS have reported the higher concentrations to be more conservative.**
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW139_210608	0089_QC101_210608	0089_MW149_210608	0089_QC105_210608	0089_MW272_210608
				Sampling date / time	08-Jun-2021 08:46	08-Jun-2021 08:48	08-Jun-2021 09:43	08-Jun-2021 09:46	08-Jun-2021 10:31
Compound	CAS Number	LOR	Unit		EP2106464-001	EP2106464-002	EP2106464-003	EP2106464-004	EP2106464-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.00	7.87	7.66	7.66	7.69
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		2310	2530	31800	39800	37700
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		22	62	431	65	45
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		155	174	350	326	154
Total Alkalinity as CaCO3	----	1	mg/L		155	174	350	326	154
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		145	155	2020	2460	2340
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		993	1040	14000	17300	17200
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		106	102	386	481	444
Magnesium	7439-95-4	1	mg/L		80	87	1080	1380	1300
Sodium	7440-23-5	1	mg/L		486	535	8210	10600	10100
Potassium	7440-09-7	1	mg/L		25	29	504	519	488
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		34.1	36.0	444	546	537
ø Total Cations	----	0.01	meq/L		33.6	36.3	478	612	581
ø Ionic Balance	----	0.01	%		0.70	0.31	3.71	5.72	3.93
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		2	<1	4	4	2
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW139_210608	0089_QC101_210608	0089_MW149_210608	0089_QC105_210608	0089_MW272_210608
				Sampling date / time	08-Jun-2021 08:46	08-Jun-2021 08:48	08-Jun-2021 09:43	08-Jun-2021 09:46	08-Jun-2021 10:31
Compound	CAS Number	LOR	Unit		EP2106464-001	EP2106464-002	EP2106464-003	EP2106464-004	EP2106464-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW139_210608	0089_QC101_210608	0089_MW149_210608	0089_QC105_210608	0089_MW272_210608
				Sampling date / time	08-Jun-2021 08:46	08-Jun-2021 08:48	08-Jun-2021 09:43	08-Jun-2021 09:46	08-Jun-2021 10:31
					EP2106464-001	EP2106464-002	EP2106464-003	EP2106464-004	EP2106464-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	**0.06**	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.06**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.06**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.5**	**102**	**107**	**100**	**105**
13C8-PFOA	----	0.02	%		**94.2**	**99.1**	**99.6**	**97.6**	**96.0**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW142_210608	0089_MW137_210608	0089_MW141_210608	0089_QC401_210608	0089_QC301_210608
				Sampling date / time	08-Jun-2021 10:54	08-Jun-2021 11:29	08-Jun-2021 12:05	08-Jun-2021 15:58	08-Jun-2021 15:59
Compound	CAS Number	LOR	Unit		EP2106464-006	EP2106464-007	EP2106464-008	EP2106464-009	EP2106464-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.66	7.75	7.61	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		27000	39200	23000	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		124	197	94	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		324	183	400	----	----
Total Alkalinity as CaCO3	----	1	mg/L		324	183	400	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1550	2370	1320	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		12800	17300	11000	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		401	443	396	----	----
Magnesium	7439-95-4	1	mg/L		941	1320	784	----	----
Sodium	7440-23-5	1	mg/L		7070	10300	5920	----	----
Potassium	7440-09-7	1	mg/L		392	492	323	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		400	541	346	----	----
ø Total Cations	----	0.01	meq/L		415	591	350	----	----
ø Ionic Balance	----	0.01	%		1.86	4.44	0.62	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		9	6	6	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.09	<0.02	0.38	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.21	<0.02	0.76	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		4.21	0.02	10.8	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		0.12	<0.02	0.79	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW142_210608	0089_MW137_210608	0089_MW141_210608	0089_QC401_210608	0089_QC301_210608
				Sampling date / time	08-Jun-2021 10:54	08-Jun-2021 11:29	08-Jun-2021 12:05	08-Jun-2021 15:58	08-Jun-2021 15:59
Compound	CAS Number	LOR	Unit		EP2106464-006	EP2106464-007	EP2106464-008	EP2106464-009	EP2106464-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**2.50**	<0.01	**34.9**	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	**0.2**	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.21**	<0.02	**0.75**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**2.02**	<0.02	**7.77**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.06**	<0.02	**0.23**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.30**	<0.01	**0.91**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW142_210608	0089_MW137_210608	0089_MW141_210608	0089_QC401_210608	0089_QC301_210608
				Sampling date / time	08-Jun-2021 10:54	08-Jun-2021 11:29	08-Jun-2021 12:05	08-Jun-2021 15:58	08-Jun-2021 15:59
					EP2106464-006	EP2106464-007	EP2106464-008	EP2106464-009	EP2106464-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**9.72**	**0.02**	**57.5**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**6.71**	**0.02**	**45.7**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**9.39**	**0.02**	**55.9**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**98.6**	**106**	**105**	**99.4**
13C8-PFOA	----	0.02	%		**96.0**	**97.1**	**95.7**	**106**	**99.2**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC302_210608	0089_QC402_210608	----	----	----
				Sampling date / time	08-Jun-2021 16:00	08-Jun-2021 16:01	----	----	----
Compound	CAS Number	LOR	Unit		EP2106464-011	EP2106464-012	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC302_210608	0089_QC402_210608	----	----	----
				Sampling date / time	08-Jun-2021 16:00	08-Jun-2021 16:01	----	----	----
Compound	CAS Number	LOR	Unit		EP2106464-011	EP2106464-012	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**106**	**99.1**	----	----	----
13C8-PFOA	----	0.02	%		**103**	**98.6**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106464**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23817	Issue Date	: 24-Jun-2021
Sampler	: [redacted], [redacted]		
Site	: AH DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3738726)									
EP2106387-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.59	6.50	1.4	0% - 20%
EP2106438-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.97	6.98	0.1	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3738728)									
EP2106548-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.48	7.47	0.1	0% - 20%
EP2106584-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.60	8.67	0.8	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3733890)									
EP2106448-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	476	449	5.8	0% - 20%
EP2106448-009	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	33000	32500	1.3	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3733892)									
EP2106437-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	10200	10100	0.6	0% - 20%
EP2106438-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	109000	105000	3.5	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3733891)									
EP2106448-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	59	56	4.3	0% - 50%
EP2106448-011	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	64	74	14.9	0% - 50%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3733893)									
EP2106464-002	0089_QC101_210608	EA025H: Suspended Solids (SS)	----	5	mg/L	62	62	0.0	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3738724)									
EP2106387-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	32	32	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	32	32	0.0	0% - 20%
EP2106438-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	86	87	0.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3738724) - continued									
EP2106438-006	Anonymous	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	86	87	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3738727)									
EP2106548-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	82	90	9.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	82	90	9.4	0% - 20%
EP2106548-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	80	81	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	80	81	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3729881)									
EP2106517-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2620	2610	0.4	0% - 20%
EP2106464-001	0089_MW139_210608	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	145	144	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3729882)									
EP2106517-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18500	18300	1.0	0% - 20%
EP2106464-001	0089_MW139_210608	ED045G: Chloride	16887-00-6	1	mg/L	993	986	0.8	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3731462)									
EP2106448-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	89	91	2.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	16	16	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	29	29	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EP2106448-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	451	443	1.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1160	1140	1.9	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	8180	8020	2.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	448	438	2.2	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3734545)									
EP2106450-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	3	0.0	No Limit
EP2106450-011	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	1	<1	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3734569)									
EP2106464-003	0089_MW149_210608	EP005: Total Organic Carbon	----	1	mg/L	4	4	0.0	No Limit
EP2106465-005	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	15	14	8.7	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3742145)									
EP2106464-003	0089_MW149_210608	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3742145)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3742145) - continued									
EP2106464-003	0089_MW149_210608	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3742145)									
EP2106464-003	0089_MW149_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3742145)									
EP2106464-003	0089_MW149_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3742145)									
EP2106464-003	0089_MW149_210608	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3738726)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.0	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3738728)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3733890)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	105	88.1	114
				<10	1000 mg/L	103	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3733892)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	102	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3733891)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	103	89.1	120
				<5	1000 mg/L	102	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3733893)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	109	89.1	120
				<5	1000 mg/L	101	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3738724)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	96.5	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3738727)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	103	81.2	126
				<1	200 mg/L	96.7	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729881)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.0	87.7	113
				<1	500 mg/L	101	87.7	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 3729882)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.4	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3731462)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.1	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.1	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3734545)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	99.3	87.2	116
				<1	100 mg/L	106	87.2	116
EP005: Total Organic Carbon (TOC) (QCLot: 3734569)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	99.4	87.2	116
				<1	100 mg/L	106	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3742145)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	117	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	110	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	121	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	117	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	115	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3742145)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	110	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	117	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	126	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	120	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	111	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	121	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	120	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	124	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3742145)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	116	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	122	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	112	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	120	66.0	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3742145) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	126	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	124	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	114	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3742145)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	131	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	123	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	124	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	115	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729881)							
EP2106445-009	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	97.6	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3729882)							
EP2106464-001	0089_MW139_210608	ED045G: Chloride	16887-00-6	1000 mg/L	87.1	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3734545)							
EP2106450-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	104	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3734569)							
EP2106464-004	0089_QC105_210608	EP005: Total Organic Carbon	----	100 mg/L	106	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3742145)							
EP2106464-007	0089_MW137_210608	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	113	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	122	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	99.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	116	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	111	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	120	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3742145)							
EP2106464-007	0089_MW137_210608	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	108	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	115	72.0	129

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3742145) - continued							
EP2106464-007	0089_MW137_210608	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	117	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	118	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	122	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	128	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	125	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	123	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	127	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	112	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	116	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3742145)							
EP2106464-007	0089_MW137_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	101	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	132	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	110	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	110	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	115	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	108	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	110	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3742145)							
EP2106464-007	0089_MW137_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	125	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	138	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	127	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	107	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106464**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: AH DEF19009/Stirling GW	Issue Date	: 24-Jun-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 12
Order number	: DEF19009/730	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW139_210608,	0089_QC101_210608,	----	----	----	16-Jun-2021	08-Jun-2021	**8**
0089_MW149_210608,	0089_QC105_210608,						
0089_MW272_210608,	0089_MW142_210608,						
0089_MW137_210608,	0089_MW141_210608						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	18	5.56	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_MW139_210608,	0089_QC101_210608,	**08-Jun-2021**	**----**	----	----	**16-Jun-2021**	08-Jun-2021	×
0089_MW149_210608,	0089_QC105_210608,							
0089_MW272_210608,	0089_MW142_210608,							
0089_MW137_210608,	0089_MW141_210608							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_MW139_210608,	0089_QC101_210608,	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	15-Jun-2021	✓
0089_MW149_210608,	0089_QC105_210608,							
0089_MW272_210608,	0089_MW142_210608,							
0089_MW137_210608,	0089_MW141_210608							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW139_210608, 0089_QC101_210608, 0089_MW149_210608, 0089_QC105_210608, 0089_MW272_210608, 0089_MW142_210608, 0089_MW137_210608, 0089_MW141_210608	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	15-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW139_210608, 0089_QC101_210608, 0089_MW149_210608, 0089_QC105_210608, 0089_MW272_210608, 0089_MW142_210608, 0089_MW137_210608, 0089_MW141_210608	**08-Jun-2021**	**----**	----	----	**16-Jun-2021**	22-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW139_210608, 0089_QC101_210608, 0089_MW149_210608, 0089_QC105_210608, 0089_MW272_210608, 0089_MW142_210608, 0089_MW137_210608, 0089_MW141_210608	**08-Jun-2021**	**----**	----	----	**18-Jun-2021**	06-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW139_210608, 0089_QC101_210608, 0089_MW149_210608, 0089_QC105_210608, 0089_MW272_210608, 0089_MW142_210608, 0089_MW137_210608, 0089_MW141_210608	**08-Jun-2021**	**----**	----	----	**18-Jun-2021**	06-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW139_210608, 0089_QC101_210608, 0089_MW149_210608, 0089_QC105_210608, 0089_MW272_210608, 0089_MW142_210608, 0089_MW137_210608, 0089_MW141_210608	**08-Jun-2021**	**----**	----	----	**15-Jun-2021**	15-Jun-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW139_210608, 0089_QC101_210608, 0089_MW149_210608, 0089_QC105_210608, 0089_MW272_210608, 0089_MW142_210608, 0089_MW137_210608, 0089_MW141_210608	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	06-Jul-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW139_210608, 0089_QC101_210608, 0089_MW149_210608, 0089_QC105_210608, 0089_MW272_210608, 0089_MW142_210608, 0089_MW137_210608, 0089_MW141_210608, 0089_QC401_210608, 0089_QC301_210608, 0089_QC302_210608, 0089_QC402_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW139_210608, 0089_QC101_210608, 0089_MW149_210608, 0089_QC105_210608, 0089_MW272_210608, 0089_MW142_210608, 0089_MW137_210608, 0089_MW141_210608, 0089_QC401_210608, 0089_QC301_210608, 0089_QC302_210608, 0089_QC402_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW139_210608, 0089_QC101_210608, 0089_MW149_210608, 0089_QC105_210608, 0089_MW272_210608, 0089_MW142_210608, 0089_MW137_210608, 0089_MW141_210608, 0089_QC401_210608, 0089_QC301_210608, 0089_QC302_210608, 0089_QC402_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW139_210608, 0089_QC101_210608, 0089_MW149_210608, 0089_QC105_210608, 0089_MW272_210608, 0089_MW142_210608, 0089_MW137_210608, 0089_MW141_210608, 0089_QC401_210608, 0089_QC301_210608, 0089_QC302_210608, 0089_QC402_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW139_210608, 0089_QC101_210608, 0089_MW149_210608, 0089_QC105_210608, 0089_MW272_210608, 0089_MW142_210608, 0089_MW137_210608, 0089_MW141_210608, 0089_QC401_210608, 0089_QC301_210608, 0089_QC302_210608, 0089_QC402_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	26	**11.54**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	26	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106464**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23817	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: AH DEF19009/Stirling GW		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 12:45	Issue Date	: 10-Jun-2021
Client Requested Due Date	: 21-Jun-2021	Scheduled Reporting Date	: **21-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106464-001	08-Jun-2021 08:46	0089_MW139_210608	✓	✓	✓	✓	✓	✓	✓
EP2106464-002	08-Jun-2021 08:48	0089_QC101_210608	✓	✓	✓	✓	✓	✓	✓
EP2106464-003	08-Jun-2021 09:43	0089_MW149_210608	✓	✓	✓	✓	✓	✓	✓
EP2106464-004	08-Jun-2021 09:46	0089_QC105_210608	✓	✓	✓	✓	✓	✓	✓
EP2106464-005	08-Jun-2021 10:31	0089_MW272_210608	✓	✓	✓	✓	✓	✓	✓
EP2106464-006	08-Jun-2021 10:54	0089_MW142_210608	✓	✓	✓	✓	✓	✓	✓
EP2106464-007	08-Jun-2021 11:29	0089_MW137_210608	✓	✓	✓	✓	✓	✓	✓
EP2106464-008	08-Jun-2021 12:05	0089_MW141_210608	✓	✓	✓	✓	✓	✓	✓
EP2106464-009	08-Jun-2021 15:58	0089_QC401_210608					✓		
EP2106464-010	08-Jun-2021 15:59	0089_QC301_210608					✓		
EP2106464-011	08-Jun-2021 16:00	0089_QC302_210608					✓		
EP2106464-012	08-Jun-2021 16:01	0089_QC402_210608					✓		

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP005 Total Organic Carbon (TOC)
EP2106464-001	08-Jun-2021 08:46	0089_MW139_210608	✓
EP2106464-002	08-Jun-2021 08:48	0089_QC101_210608	✓
EP2106464-003	08-Jun-2021 09:43	0089_MW149_210608	✓
EP2106464-004	08-Jun-2021 09:46	0089_QC105_210608	✓
EP2106464-005	08-Jun-2021 10:31	0089_MW272_210608	✓
EP2106464-006	08-Jun-2021 10:54	0089_MW142_210608	✓
EP2106464-007	08-Jun-2021 11:29	0089_MW137_210608	✓
EP2106464-008	08-Jun-2021 12:05	0089_MW141_210608	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
0089_MW137_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	✘	----	----
0089_MW139_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	✘	----	----
0089_MW141_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	✘	----	----
0089_MW142_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	✘	----	----
0089_MW149_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	✘	----	----
0089_MW272_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	✘	----	----
0089_QC101_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	✘	----	----
0089_QC105_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	✘	----	----

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2106464

Telephone : – 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA-0089-PFASOTP **Client:** CARDNO **Project Manage** [redacted]

Phone:)

ALS Compass COC Reference: 23850 23817 23829 23826 23851 23821 **# Samples:** **Sampler:**

Phone:)

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send QC2** (x10) to Eurofins

Custody:

Relinquished by: CARDNO	Received by: [redacted]	Relinquished by:	Received by:
Date / Time: 9/6/21	Date / Time: 9/6 1245	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 23817 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW139	toc not doc - not filtered	08/06/2021 08:46 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
002	0089_QC101	toc not doc - not filtered	08/06/2021 08:48 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
003	0089_MW149	extra for qc	08/06/2021 09:43 AM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8		X		
004	0089_QC105		08/06/2021 09:46 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
005	0089_MW272		08/06/2021 10:31 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
006	0089_MW142		08/06/2021 10:54 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
007	0089_MW137	extra for qc	08/06/2021 11:29 AM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8		X		
008	0089_MW141		08/06/2021 12:05 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
009	0089_QC401		08/06/2021 03:58 PM	Water	ALS: 2 Non ALS: 0	No		X			

CHAIN OF CUSTODY

(ALS) COC#: **23817** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_QC301		08/06/2021 03:59 PM	Water	ALS: 2 Non ALS: 0	No		X			
011	0089_QC302		08/06/2021 04:00 PM	Water	ALS: 2 Non ALS: 0	No		X			
012	0089_QC402		08/06/2021 04:01 PM	Water	ALS: 2 Non ALS: 0	No		X			

CHAIN OF CUSTODY

COC#: 23817 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW139	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_QC101	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW149	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_QC105	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW272	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: 23817 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW142	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW137	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW141	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: 23817 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW139	Clear Plastic Bottle - Natural	250 mL	00070220025354	Green	No	
001	0089_MW139	Clear Plastic Bottle - Natural	250 mL	00070220025403	Green	No	
001	0089_MW139	HDPE (no PTFE)	20 mL	00350019151062	Grey	No	
001	0089_MW139	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181020016791	Purple	No	
001	0089_MW139	HDPE (no PTFE)	20 mL	00350019150763	Grey	No	
002	0089_QC101	HDPE (no PTFE)	20 mL	00350019150870	Grey	No	
002	0089_QC101	HDPE (no PTFE)	20 mL	00350019151175	Grey	No	
002	0089_QC101	Clear Plastic Bottle - Natural	250 mL	00070220025472	Green	No	
002	0089_QC101	Clear Plastic Bottle - Natural	250 mL	00070220025607	Green	No	
002	0089_QC101	Amber DOC Filtered- Sulfuric Preserved	40 mL	00181020001161	Purple	No	
003	0089_MW149	Clear Plastic Bottle - Natural	250 mL	00070220025199	Green	No	
003	0089_MW149	Clear Plastic Bottle - Natural	250 mL	00070220025205	Green	No	
003	0089_MW149	HDPE (no PTFE)	20 mL	00350019150790	Grey	No	
003	0089_MW149	HDPE (no PTFE)	20 mL	00350019151049	Grey	No	
003	0089_MW149	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016684	Purple	No	
003	0089_MW149	HDPE (no PTFE)	20 mL	00352005020439	Grey	No	
003	0089_MW149	HDPE (no PTFE)	20 mL	00352005020371	Grey	No	
004	0089_QC105	HDPE (no PTFE)	20 mL	00350019150756	Grey	No	
004	0089_QC105	HDPE (no PTFE)	20 mL	00350019151337	Grey	No	
004	0089_QC105	Clear Plastic Bottle - Natural	250 mL	00070220025382	Green	No	
004	0089_QC105	Clear Plastic Bottle - Natural	250 mL	00070220025224	Green	No	
004	0089_QC105	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016754	Purple	No	
005	0089_MW272	Clear Plastic Bottle - Natural	250 mL	00070220025027	Green	No	
005	0089_MW272	Clear Plastic Bottle - Natural	250 mL	00070220025064	Green	No	
005	0089_MW272	HDPE (no PTFE)	20 mL	00350019150894	Grey	No	
005	0089_MW272	HDPE (no PTFE)	20 mL	00350019151136	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 23817 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

005	0089_MW272	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016759	Purple	No	
006	0089_MW142	Clear Plastic Bottle - Natural	250 mL	00070220025040	Green	No	
006	0089_MW142	Clear Plastic Bottle - Natural	250 mL	00070220024713	Green	No	
006	0089_MW142	HDPE (no PTFE)	20 mL	00350019151053	Grey	No	
006	0089_MW142	HDPE (no PTFE)	20 mL	00350019150863	Grey	No	
006	0089_MW142	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014550	Purple	No	
007	0089_MW137	Clear Plastic Bottle - Natural	250 mL	00070220025373	Green	No	
007	0089_MW137	Clear Plastic Bottle - Natural	250 mL	00070220025390	Green	No	
007	0089_MW137	HDPE (no PTFE)	20 mL	00352010058867	Grey	No	
007	0089_MW137	HDPE (no PTFE)	20 mL	00352010058916	Grey	No	
007	0089_MW137	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001081	Purple	No	
007	0089_MW137	HDPE (no PTFE)	20 mL	00352005020530	Grey	No	
007	0089_MW137	HDPE (no PTFE)	20 mL	00352005020388	Grey	No	
008	0089_MW141	Clear Plastic Bottle - Natural	250 mL	00070220025408	Green	No	
008	0089_MW141	Clear Plastic Bottle - Natural	250 mL	00070220025371	Green	No	
008	0089_MW141	HDPE (no PTFE)	20 mL	00350019150840	Grey	No	
008	0089_MW141	HDPE (no PTFE)	20 mL	00350019150810	Grey	No	
008	0089_MW141	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016885	Purple	No	
009	0089_QC401	HDPE (no PTFE)	20 mL	00352005020476	Grey	No	
009	0089_QC401	HDPE (no PTFE)	20 mL	00352005020433	Grey	No	
010	0089_QC301	HDPE (no PTFE)	20 mL	00352005020567	Grey	No	
010	0089_QC301	HDPE (no PTFE)	20 mL	00350019112915	Grey	No	
011	0089_QC302	HDPE (no PTFE)	20 mL	00352005020507	Grey	No	
011	0089_QC302	HDPE (no PTFE)	20 mL	00352005020572	Grey	No	
012	0089_QC402	HDPE (no PTFE)	20 mL	00352005020621	Grey	No	
012	0089_QC402	HDPE (no PTFE)	20 mL	00352005020536	Grey	No	

Total Bottle Count: ALS: 52, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106465**	Page	: 1 of 15
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 12:45
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23826	Issue Date	: 22-Jun-2021 22:48
Sampler	: [redacted], [redacted]		
Site	: Ah DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 17		
No. of samples analysed	: 17		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EA015: Total Dissolved Solids for sample #11 confirmed by re-preparation and re-analysis.
- EP005: Total Organic Carbon for sample #2 confirmed by re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW329_210608	0089_QC103_210608	0089_PW358_210608	0089_QC107_210608	0089_PW330_210608
				Sampling date / time	08-Jun-2021 09:20	08-Jun-2021 09:21	08-Jun-2021 09:56	08-Jun-2021 09:58	08-Jun-2021 10:29
Compound	CAS Number	LOR	Unit		EP2106465-002	EP2106465-003	EP2106465-004	EP2106465-005	EP2106465-007
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.69	7.69	7.66	7.56	7.85
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		40900	42500	44300	43400	39600
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		522	352	38	32	57
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		146	140	125	136	138
Total Alkalinity as CaCO3	----	1	mg/L		146	140	125	136	138
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2640	2700	2700	2740	2570
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17300	17500	19000	19000	18200
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		466	473	492	498	465
Magnesium	7439-95-4	1	mg/L		1420	1430	1550	1510	1410
Sodium	7440-23-5	1	mg/L		11000	11000	11800	11700	10900
Potassium	7440-09-7	1	mg/L		595	593	660	638	594
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		546	553	595	596	570
ø Total Cations	----	0.01	meq/L		634	635	682	674	628
ø Ionic Balance	----	0.01	%		7.45	6.93	6.86	6.19	4.92
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		40	13	8	15	6
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW329_210608	0089_QC103_210608	0089_PW358_210608	0089_QC107_210608	0089_PW330_210608
				Sampling date / time	08-Jun-2021 09:20	08-Jun-2021 09:21	08-Jun-2021 09:56	08-Jun-2021 09:58	08-Jun-2021 10:29
Compound	CAS Number	LOR	Unit		EP2106465-002	EP2106465-003	EP2106465-004	EP2106465-005	EP2106465-007
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW329_210608	0089_QC103_210608	0089_PW358_210608	0089_QC107_210608	0089_PW330_210608
				Sampling date / time	08-Jun-2021 09:20	08-Jun-2021 09:21	08-Jun-2021 09:56	08-Jun-2021 09:58	08-Jun-2021 10:29
					EP2106465-002	EP2106465-003	EP2106465-004	EP2106465-005	EP2106465-007
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**106**	**106**	**113**	**99.3**	**106**
13C8-PFOA	----	0.02	%		**91.8**	**94.8**	**94.4**	**93.6**	**96.6**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW357_210608	0089_PW331_210608	0089_PW356_210608	0089_PW335_210608	0089_PW364_210608
				Sampling date / time	08-Jun-2021 10:43	08-Jun-2021 11:33	08-Jun-2021 11:57	08-Jun-2021 13:07	08-Jun-2021 13:15
Compound	CAS Number	LOR	Unit		EP2106465-008	EP2106465-012	EP2106465-013	EP2106465-015	EP2106465-016
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.79	7.83	7.77	7.73	7.76
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		44200	43000	43400	43000	41800
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		87	102	178	119	391
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		142	110	110	125	116
Total Alkalinity as CaCO3	----	1	mg/L		142	110	110	125	116
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2600	2660	2620	2600	2670
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		18900	18900	18900	18600	18700
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		490	446	460	460	461
Magnesium	7439-95-4	1	mg/L		1470	1400	1450	1430	1440
Sodium	7440-23-5	1	mg/L		11400	10800	11200	11000	11100
Potassium	7440-09-7	1	mg/L		616	584	607	586	592
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		590	591	590	581	585
ø Total Cations	----	0.01	meq/L		657	622	645	634	639
ø Ionic Balance	----	0.01	%		5.37	2.59	4.46	4.34	4.41
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		<1	5	5	2	2
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW357_210608	0089_PW331_210608	0089_PW356_210608	0089_PW335_210608	0089_PW364_210608
				Sampling date / time	08-Jun-2021 10:43	08-Jun-2021 11:33	08-Jun-2021 11:57	08-Jun-2021 13:07	08-Jun-2021 13:15
Compound	CAS Number	LOR	Unit		EP2106465-008	EP2106465-012	EP2106465-013	EP2106465-015	EP2106465-016
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.02**	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW357_210608	0089_PW331_210608	0089_PW356_210608	0089_PW335_210608	0089_PW364_210608
				Sampling date / time	08-Jun-2021 10:43	08-Jun-2021 11:33	08-Jun-2021 11:57	08-Jun-2021 13:07	08-Jun-2021 13:15
Compound	CAS Number	LOR	Unit		EP2106465-008	EP2106465-012	EP2106465-013	EP2106465-015	EP2106465-016
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	**0.12**	<0.05	**0.07**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.12**	**0.02**	**0.09**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.02**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.12**	**0.02**	**0.09**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**98.4**	**105**	**108**	**113**	**111**
13C8-PFOA	----	0.02	%		**93.2**	**96.5**	**95.6**	**95.2**	**96.9**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW156_210608	0089_SW154_210608	0089_SW152_210608	0089_SW150_210608	0089_QC109_210608
				Sampling date / time	08-Jun-2021 09:12	08-Jun-2021 10:06	08-Jun-2021 10:46	08-Jun-2021 11:23	08-Jun-2021 11:25
Compound	CAS Number	LOR	Unit		EP2106465-001	EP2106465-006	EP2106465-009	EP2106465-010	EP2106465-011
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.94	8.09	8.10	8.11	8.00
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		40800	43000	38400	42400	33500
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		12	50	92	73	36
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		113	111	113	114	113
Total Alkalinity as CaCO3	----	1	mg/L		113	111	113	114	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2750	2640	2700	2670	2720
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		18000	18800	18800	19100	18900
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		463	465	463	438	454
Magnesium	7439-95-4	1	mg/L		1470	1470	1460	1390	1440
Sodium	7440-23-5	1	mg/L		11400	11300	11300	10800	11100
Potassium	7440-09-7	1	mg/L		618	614	611	578	601
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		567	588	589	597	592
ø Total Cations	----	0.01	meq/L		656	651	650	621	639
ø Ionic Balance	----	0.01	%		7.24	5.16	4.97	1.98	3.84
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		1	<1	2	1	3
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW156_210608	0089_SW154_210608	0089_SW152_210608	0089_SW150_210608	0089_QC109_210608
				Sampling date / time	08-Jun-2021 09:12	08-Jun-2021 10:06	08-Jun-2021 10:46	08-Jun-2021 11:23	08-Jun-2021 11:25
Compound	CAS Number	LOR	Unit		EP2106465-001	EP2106465-006	EP2106465-009	EP2106465-010	EP2106465-011
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SW156_210608	0089_SW154_210608	0089_SW152_210608	0089_SW150_210608	0089_QC109_210608
				Sampling date / time	08-Jun-2021 09:12	08-Jun-2021 10:06	08-Jun-2021 10:46	08-Jun-2021 11:23	08-Jun-2021 11:25
					EP2106465-001	EP2106465-006	EP2106465-009	EP2106465-010	EP2106465-011
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**106**	**108**	**101**	**103**
13C8-PFOA	----	0.02	%		**96.3**	**96.6**	**94.8**	**97.7**	**101**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW130_210608	0089_SW132_210608	----	----	----
			Sampling date / time	08-Jun-2021 13:05	08-Jun-2021 13:21	----	----	----
Compound	CAS Number	LOR	Unit	EP2106465-014	EP2106465-017	--------	--------	--------
				Result	Result	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**7.81**	**7.87**	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**43600**	**37800**	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**1060**	**1160**	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**117**	**117**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**117**	**117**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**2720**	**2660**	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**18900**	**18800**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**464**	**441**	----	----	----
Magnesium	7439-95-4	1	mg/L	**1460**	**1410**	----	----	----
Sodium	7440-23-5	1	mg/L	**11300**	**10700**	----	----	----
Potassium	7440-09-7	1	mg/L	**606**	**580**	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**592**	**588**	----	----	----
ø Total Cations	----	0.01	meq/L	**650**	**618**	----	----	----
ø Ionic Balance	----	0.01	%	**4.68**	**2.51**	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**10**	**5**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW130_210608	0089_SW132_210608	----	----	----
			Sampling date / time	08-Jun-2021 13:05	08-Jun-2021 13:21	----	----	----
Compound	CAS Number	LOR	Unit	EP2106465-014	EP2106465-017	--------	--------	--------
				Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.05**	**0.01**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW130_210608	0089_SW132_210608	----	----	----
				Sampling date / time	08-Jun-2021 13:05	08-Jun-2021 13:21	----	----	----
Compound	CAS Number	LOR	Unit		EP2106465-014	EP2106465-017	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.05**	**0.01**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.05**	**0.01**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.05**	**0.01**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**106**	**105**	----	----	----
13C8-PFOA	----	0.02	%		**96.5**	**97.5**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106465**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23826	Issue Date	: 22-Jun-2021
Sampler	: [redacted], [redacted]		
Site	: Ah DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 17		
No. of samples analysed	: 17		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA005P: pH by PC Titrator (QC Lot: 3741436)									
EP2106450-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.68	7.59	1.2	0% - 20%
EP2106450-011	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.65	7.67	0.3	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3741438)									
EP2106465-005	0089_QC107_210608	EA005-P: pH Value	----	0.01	pH Unit	7.56	7.60	0.5	0% - 20%
EP2106494-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.04	7.06	0.3	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3735176)									
EP2106465-001	0089_SW156_210608	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	40800	42600	4.4	0% - 20%
EP2106465-009	0089_SW152_210608	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	38400	43000	11.2	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3735177)									
EP2106465-001	0089_SW156_210608	EA025H: Suspended Solids (SS)	----	5	mg/L	12	13	8.0	No Limit
EP2106465-011	0089_QC109_210608	EA025H: Suspended Solids (SS)	----	5	mg/L	36	36	0.0	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3741435)									
EP2106450-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	123	118	4.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	123	118	4.4	0% - 20%
EP2106450-011	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	120	122	1.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	120	122	1.4	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3741437)									
EP2106465-005	0089_QC107_210608	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	136	124	9.3	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3741437) - continued									
EP2106465-005	0089_QC107_210608	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	136	124	9.3	0% - 20%
EP2106494-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	109	110	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	109	110	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3729885)									
EP2106450-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2810	2760	2.1	0% - 20%
EP2106450-011	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2640	2630	0.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734681)									
EP2106465-005	0089_QC107_210608	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2740	2740	0.1	0% - 20%
EP2106465-015	0089_PW335_210608	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2600	2520	3.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3729886)									
EP2106450-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	17800	17700	0.8	0% - 20%
EP2106450-011	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18800	18800	0.2	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3734682)									
EP2106465-005	0089_QC107_210608	ED045G: Chloride	16887-00-6	1	mg/L	19000	19000	0.4	0% - 20%
EP2106465-015	0089_PW335_210608	ED045G: Chloride	16887-00-6	1	mg/L	18600	18600	0.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3731465)									
EP2106465-001	0089_SW156_210608	ED093F: Calcium	7440-70-2	1	mg/L	463	450	3.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1470	1430	2.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11400	11100	2.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	618	600	2.9	0% - 20%
EP2106465-011	0089_QC109_210608	ED093F: Calcium	7440-70-2	1	mg/L	454	447	1.4	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1440	1420	1.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11100	10900	2.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	601	587	2.4	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3734569)									
EP2106464-003	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	4	0.0	No Limit
EP2106465-005	0089_QC107_210608	EP005: Total Organic Carbon	----	1	mg/L	15	14	8.7	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3734581)									
EP2106465-015	0089_PW335_210608	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.0	No Limit
EP2106517-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	86	87	1.2	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3742143)									
EP2106465-001	0089_SW156_210608	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3742143) - continued									
EP2106465-008	0089_PW357_210608	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3742143)									
EP2106465-001	0089_SW156_210608	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2106465-008	0089_PW357_210608	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3742143)									
EP2106465-001	0089_SW156_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3742143) - continued									
EP2106465-001	0089_SW156_210608	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106465-008	0089_PW357_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3742143)									
EP2106465-001	0089_SW156_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106465-008	0089_PW357_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3742143)									
EP2106465-001	0089_SW156_210608	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2106465-008	0089_PW357_210608	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3741436)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 3741438)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.0	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3735176)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	103	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3735177)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	104	89.1	120
				<5	1000 mg/L	101	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3741435)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	96.6	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3741437)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	96.6	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729885)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.2	87.7	113
				<1	500 mg/L	105	87.7	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734681)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.2	87.7	113
				<1	500 mg/L	105	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3729886)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.8	87.9	114
				<1	1000 mg/L	97.7	87.9	114

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 3734682)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.9	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3731465)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	108	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.0	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3734569)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	99.4	87.2	116
				<1	100 mg/L	106	87.2	116
EP005: Total Organic Carbon (TOC) (QCLot: 3734581)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	102	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3742143)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	97.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	105	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	99.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	102	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	108	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3742143)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	101	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	112	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	112	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	121	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	109	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	115	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3742143)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	96.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	112	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	111	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	109	66.0	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3742143) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	103	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	125	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	126	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3742143)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	101	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	111	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	124	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	109	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729885)							
EP2106450-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734681)							
EP2106465-005	0089_QC107_210608	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3729886)							
EP2106450-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3734682)							
EP2106465-005	0089_QC107_210608	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3734569)							
EP2106464-004	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	106	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3734581)							
EP2106465-016	0089_PW364_210608	EP005: Total Organic Carbon	----	100 mg/L	110	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3742143)							
EP2106465-001	0089_SW156_210608	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	111	72.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3742143) - continued							
EP2106465-001	0089_SW156_210608	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	125	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	106	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	126	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	122	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	121	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3742143)							
EP2106465-001	0089_SW156_210608	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	108	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	117	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	120	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	122	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	127	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	126	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	127	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	128	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	119	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	117	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	122	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3742143)							
EP2106465-001	0089_SW156_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	120	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	115	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	124	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	121	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	129	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	128	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	120	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3742143)							
EP2106465-001	0089_SW156_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	121	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	128	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	124	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	122	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106465**	Page	: 1 of 10
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: Ah DEF19009/Stirling SW/PW	Issue Date	: 22-Jun-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 17
Order number	: DEF19009/730	No. of samples analysed	: 17

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2106450--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2106465--005	0089_QC107_210608	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2106450--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2106465--005	0089_QC107_210608	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_SW156_210608,	0089_PW329_210608,	----	----	----	17-Jun-2021	08-Jun-2021	**9**
0089_QC103_210608,	0089_PW358_210608,						
0089_QC107_210608,	0089_SW154_210608,						
0089_PW330_210608,	0089_PW357_210608,						
0089_SW152_210608,	0089_SW150_210608,						
0089_QC109_210608,	0089_PW331_210608,						
0089_PW356_210608,	0089_SW130_210608,						
0089_PW335_210608,	0089_PW364_210608,						
0089_SW132_210608							

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**----**	----	----	**17-Jun-2021**	08-Jun-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**----**	----	----	**15-Jun-2021**	15-Jun-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**----**	----	----	**15-Jun-2021**	15-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**----**	----	----	**17-Jun-2021**	22-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**----**	----	----	**21-Jun-2021**	06-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**----**	----	----	**21-Jun-2021**	06-Jul-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	15-Jun-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	06-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW156_210608, 0089_PW329_210608, 0089_QC103_210608, 0089_PW358_210608, 0089_QC107_210608, 0089_SW154_210608, 0089_PW330_210608, 0089_PW357_210608, 0089_SW152_210608, 0089_SW150_210608, 0089_QC109_210608, 0089_PW331_210608, 0089_PW356_210608, 0089_SW130_210608, 0089_PW335_210608, 0089_PW364_210608, 0089_SW132_210608	**08-Jun-2021**	**18-Jun-2021**	05-Dec-2021	✓	**18-Jun-2021**	05-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	17	**11.76**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	17	**5.88**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106465**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 4
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23826	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Ah DEF19009/Stirling SW/PW		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 12:45	Issue Date	: 10-Jun-2021
Client Requested Due Date	: 21-Jun-2021	Scheduled Reporting Date	: **21-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 17 / 17

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106465-001	08-Jun-2021 09:12	0089_SW156_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-002	08-Jun-2021 09:20	0089_PW329_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-003	08-Jun-2021 09:21	0089_QC103_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-004	08-Jun-2021 09:56	0089_PW358_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-005	08-Jun-2021 09:58	0089_QC107_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-006	08-Jun-2021 10:06	0089_SW154_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-007	08-Jun-2021 10:29	0089_PW330_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-008	08-Jun-2021 10:43	0089_PW357_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-009	08-Jun-2021 10:46	0089_SW152_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-010	08-Jun-2021 11:23	0089_SW150_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-011	08-Jun-2021 11:25	0089_QC109_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-012	08-Jun-2021 11:33	0089_PW331_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-013	08-Jun-2021 11:57	0089_PW356_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-014	08-Jun-2021 13:05	0089_SW130_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-015	08-Jun-2021 13:07	0089_PW335_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-016	08-Jun-2021 13:15	0089_PW364_210608	✓	✓	✓	✓	✓	✓	✓
EP2106465-017	08-Jun-2021 13:21	0089_SW132_210608	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106465-001	08-Jun-2021 09:12	0089_SW156_210608	✓
EP2106465-002	08-Jun-2021 09:20	0089_PW329_210608	✓
EP2106465-003	08-Jun-2021 09:21	0089_QC103_210608	✓
EP2106465-004	08-Jun-2021 09:56	0089_PW358_210608	✓
EP2106465-005	08-Jun-2021 09:58	0089_QC107_210608	✓
EP2106465-006	08-Jun-2021 10:06	0089_SW154_210608	✓
EP2106465-007	08-Jun-2021 10:29	0089_PW330_210608	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106465-008	08-Jun-2021 10:43	0089_PW357_210608	✓
EP2106465-009	08-Jun-2021 10:46	0089_SW152_210608	✓
EP2106465-010	08-Jun-2021 11:23	0089_SW150_210608	✓
EP2106465-011	08-Jun-2021 11:25	0089_QC109_210608	✓
EP2106465-012	08-Jun-2021 11:33	0089_PW331_210608	✓
EP2106465-013	08-Jun-2021 11:57	0089_PW356_210608	✓
EP2106465-014	08-Jun-2021 13:05	0089_SW130_210608	✓
EP2106465-015	08-Jun-2021 13:07	0089_PW335_210608	✓
EP2106465-016	08-Jun-2021 13:15	0089_PW364_210608	✓
EP2106465-017	08-Jun-2021 13:21	0089_SW132_210608	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
0089_PW329_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW330_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW331_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW335_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW356_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW357_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW358_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_PW364_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_QC103_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_QC107_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_QC109_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_SW130_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_SW132_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_SW150_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_SW152_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_SW154_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----
0089_SW156_21060	Clear Plastic Bottle - Natural	----	08-Jun-2021	09-Jun-2021	×	----	----

Requested Deliverables

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2106465

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0089_PFASOTP **Client:** CARDNO **Project Manage** [redacted]

Phone: [redacted]

ALS Compass COC Reference: ~~23850~~ ~~23817~~ 23829 23826 ~~23851~~ 23821 **# Samples:** [redacted] **Sampler:** [redacted]

Phone: [redacted]

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send QC2** (x10) to Eurofins

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
CARDNO	[redacted]		
Date / Time: 9/6/21	Date / Time: 9/6 1245	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: **23826** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW156	extra for qc	08/06/2021 09:12 AM	Water	ALS: 8 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW329		08/06/2021 09:20 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
003	0089_QC103		08/06/2021 09:21 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
004	0089_PW358		08/06/2021 09:56 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
005	0089_QC107		08/06/2021 09:58 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
006	0089_SW154	extra for qc	08/06/2021 10:06 AM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8	X		
007	0089_PW330		08/06/2021 10:29 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
008	0089_PW357		08/06/2021 10:43 AM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8	X		
009	0089_SW152		08/06/2021 10:46 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

(ALS) COC#: **23826** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SW150		08/06/2021 11:23 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
011	0089_QC109		08/06/2021 11:25 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
012	0089_PW331		08/06/2021 11:33 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
013	0089_PW356		08/06/2021 11:57 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
014	0089_SW130		08/06/2021 01:05 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
015	0089_PW335		08/06/2021 01:07 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
016	0089_PW364		08/06/2021 01:15 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
017	0089_SW132		08/06/2021 01:21 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

ALS COC#: 23826 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW156	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW329	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_QC103	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_PW358	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_QC107	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **23826** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_SW154	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW330	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_PW357	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_SW152	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_SW150	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_QC109	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **23826** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

012	0089_PW331	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
013	0089_PW356	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
014	0089_SW130	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
015	0089_PW335	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
016	0089_PW364	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
017	0089_SW132	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **23826** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW156	HDPE (no PTFE)	20 mL	00350019150876	Grey	No	
001	0089_SW156	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016829	Purple	No	
001	0089_SW156	HDPE (no PTFE)	20 mL	00352005020452	Grey	No	
001	0089_SW156	HDPE (no PTFE)	20 mL	00352005020626	Grey	No	
001	0089_SW156	HDPE (no PTFE)	20 mL	00352005020559	Grey	No	
001	0089_SW156	HDPE (no PTFE)	20 mL	00350019150953	Grey	No	
001	0089_SW156	Clear Plastic Bottle - Natural	250 mL	00070220025198	Green	No	
001	0089_SW156	Clear Plastic Bottle - Natural	250 mL	00070220025207	Green	No	
002	0089_PW329	Clear Plastic Bottle - Natural	250 mL	00070220025273	Green	No	
002	0089_PW329	Clear Plastic Bottle - Natural	250 mL	00070220025271	Green	No	
002	0089_PW329	HDPE (no PTFE)	20 mL	00350019150893	Grey	No	
002	0089_PW329	HDPE (no PTFE)	20 mL	00350019151144	Grey	No	
002	0089_PW329	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016837	Purple	No	
003	0089_QC103	HDPE (no PTFE)	20 mL	00350019151061	Grey	No	
003	0089_QC103	HDPE (no PTFE)	20 mL	00350019151034	Grey	No	
003	0089_QC103	Clear Plastic Bottle - Natural	250 mL	00070220025595	Green	No	
003	0089_QC103	Clear Plastic Bottle - Natural	250 mL	00070220025359	Green	No	
003	0089_QC103	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016821	Purple	No	
004	0089_PW358	Clear Plastic Bottle - Natural	250 mL	00070220025059	Green	No	
004	0089_PW358	Clear Plastic Bottle - Natural	250 mL	00070220025072	Green	No	
004	0089_PW358	HDPE (no PTFE)	20 mL	00350019151253	Grey	No	
004	0089_PW358	HDPE (no PTFE)	20 mL	00350019151189	Grey	No	
004	0089_PW358	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014339	Purple	No	
005	0089_QC107	HDPE (no PTFE)	20 mL	00350019151162	Grey	No	
005	0089_QC107	HDPE (no PTFE)	20 mL	00350019150771	Grey	No	
005	0089_QC107	Clear Plastic Bottle - Natural	250 mL	00070220025206	Green	No	

CHAIN OF CUSTODY

ALS COC#: 23826 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

005	0089_QC107	Clear Plastic Bottle - Natural	250 mL	00070220025176	Green	No	
005	0089_QC107	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016682	Purple	No	
006	0089_SW154	Clear Plastic Bottle - Natural	250 mL	00070220024761	Green	No	
006	0089_SW154	HDPE (no PTFE)	20 mL	00350019151028	Grey	No	
006	0089_SW154	HDPE (no PTFE)	20 mL	00350019151060	Grey	No	
006	0089_SW154	Clear Plastic Bottle - Natural	250 mL	00070220025151	Green	No	
006	0089_SW154	Amber TOC Vial - Sulfuric Acid	40 mL	00181020004333	Purple	No	
006	0089_SW154	HDPE (no PTFE)	20 mL	00352005020561	Grey	No	
006	0089_SW154	HDPE (no PTFE)	20 mL	00352005020494	Grey	No	
007	0089_PW330	Clear Plastic Bottle - Natural	250 mL	00070220025580	Green	No	
007	0089_PW330	Clear Plastic Bottle - Natural	250 mL	00070220025363	Green	No	
007	0089_PW330	HDPE (no PTFE)	20 mL	00350019151254	Grey	No	
007	0089_PW330	HDPE (no PTFE)	20 mL	00350019151068	Grey	No	
007	0089_PW330	Amber TOC Vial - Sulfuric Acid	40 mL	00181020004366	Purple	No	
008	0089_PW357	HDPE (no PTFE)	20 mL	00350019150845	Grey	No	
008	0089_PW357	HDPE (no PTFE)	20 mL	00350019150815	Grey	No	
008	0089_PW357	Clear Plastic Bottle - Natural	250 mL	00070220025254	Green	No	
008	0089_PW357	Clear Plastic Bottle - Natural	250 mL	00070220025208	Green	No	
008	0089_PW357	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014322	Purple	No	
008	0089_PW357	HDPE (no PTFE)	20 mL	00352005020574	Grey	No	
008	0089_PW357	HDPE (no PTFE)	20 mL	00352005020438	Grey	No	
009	0089_SW152	Clear Plastic Bottle - Natural	250 mL	00070220025280	Green	No	
009	0089_SW152	HDPE (no PTFE)	20 mL	00350019151331	Grey	No	
009	0089_SW152	HDPE (no PTFE)	20 mL	00350019150755	Grey	No	
009	0089_SW152	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014395	Purple	No	
010	0089_SW150	Clear Plastic Bottle - Natural	250 mL	00070220025353	Green	No	
010	0089_SW150	Clear Plastic Bottle - Natural	250 mL	00070220025377	Green	No	

CHAIN OF CUSTODY

COC#: 23826 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

010	0089_SW150	HDPE (no PTFE)	20 mL	00350019151047	Grey	No	
010	0089_SW150	HDPE (no PTFE)	20 mL	00350019150896	Grey	No	
010	0089_SW150	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016757	Purple	No	
011	0089_QC109	HDPE (no PTFE)	20 mL	00350019150837	Grey	No	
011	0089_QC109	HDPE (no PTFE)	20 mL	00350019151083	Grey	No	
011	0089_QC109	Clear Plastic Bottle - Natural	250 mL	00070220025488	Green	No	
011	0089_QC109	Clear Plastic Bottle - Natural	250 mL	00070220025348	Green	No	
011	0089_QC109	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016733	Purple	No	
012	0089_PW331	Clear Plastic Bottle - Natural	250 mL	00070220025446	Green	No	
012	0089_PW331	Clear Plastic Bottle - Natural	250 mL	00070220025412	Green	No	
012	0089_PW331	HDPE (no PTFE)	20 mL	00350019150917	Grey	No	
012	0089_PW331	HDPE (no PTFE)	20 mL	00350019151252	Grey	No	
012	0089_PW331	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016858	Purple	No	
013	0089_PW356	Clear Plastic Bottle - Natural	250 mL	00070220025447	Green	No	
013	0089_PW356	HDPE (no PTFE)	20 mL	00350019150954	Grey	No	
013	0089_PW356	Clear Plastic Bottle - Natural	250 mL	00070220025338	Green	No	
013	0089_PW356	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014328	Purple	No	
013	0089_PW356	HDPE (no PTFE)	20 mL	00350019150820	Grey	No	
014	0089_SW130	Clear Plastic Bottle - Natural	250 mL	00070220025370	Green	No	
014	0089_SW130	Clear Plastic Bottle - Natural	250 mL	00070220025388	Green	No	
014	0089_SW130	HDPE (no PTFE)	20 mL	00350019150772	Grey	No	
014	0089_SW130	HDPE (no PTFE)	20 mL	00350019151071	Grey	No	
014	0089_SW130	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016760	Purple	No	
015	0089_PW335	HDPE (no PTFE)	20 mL	00350019151348	Grey	No	
015	0089_PW335	HDPE (no PTFE)	20 mL	00350019150841	Grey	No	
015	0089_PW335	Clear Plastic Bottle - Natural	250 mL	00070220025367	Green	No	
015	0089_PW335	Clear Plastic Bottle - Natural	250 mL	00070220025200	Green	No	

CHAIN OF CUSTODY

(ALS) COC#: 23826 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

015	0089_PW335	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016662	Purple	No	
016	0089_PW364	HDPE (no PTFE)	20 mL	00350019150791	Grey	No	
016	0089_PW364	HDPE (no PTFE)	20 mL	00350019151043	Grey	No	
016	0089_PW364	Clear Plastic Bottle - Natural	250 mL	00070220025269	Green	No	
016	0089_PW364	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016766	Purple	No	
017	0089_SW132	HDPE (no PTFE)	20 mL	00350019150905	Grey	No	
017	0089_SW132	HDPE (no PTFE)	20 mL	00350019150966	Grey	No	
017	0089_SW132	Clear Plastic Bottle - Natural	250 mL	00070220025192	Green	No	
017	0089_SW132	Clear Plastic Bottle - Natural	250 mL	00070220025294	Green	No	
017	0089_SW132	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016612	Purple	No	

Total Bottle Count: ALS: 90, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106466**	Page	: 1 of 15
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 12:45
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23829	Issue Date	: 18-Jun-2021 16:19
Sampler	: [redacted], [redacted]		
Site	: ah DEF19009/Stirling SED		
Quote number	: SY/139/19		
No. of samples received	: 16		
No. of samples analysed	: 16		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD329_210608	0089_QC104_210608	0089_SD358_210608	0089_QC108_210608	0089_SD330_210608
				Sampling date / time	08-Jun-2021 09:27	08-Jun-2021 09:39	08-Jun-2021 10:02	08-Jun-2021 10:04	08-Jun-2021 10:27
					EP2106466-001	EP2106466-002	EP2106466-003	EP2106466-004	EP2106466-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**9.3**	**9.3**	**9.3**	**9.2**	**9.2**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**31100**	**27600**	**32400**	**34400**	**27700**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**22.2**	**18.9**	**22.6**	**24.5**	**19.1**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**4.8**	**4.8**	**3.5**	**3.7**	**5.1**
Exchangeable Magnesium	----	0.1	meq/100g		**0.5**	**0.5**	**0.4**	**0.4**	**0.6**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		**0.1**	**0.1**	<0.1	<0.1	**0.1**
Cation Exchange Capacity	----	0.1	meq/100g		**5.4**	**5.5**	**4.0**	**4.1**	**5.8**
Exchangeable Sodium Percent	----	0.1	%		**2.3**	**2.7**	**2.3**	**2.0**	**2.5**
EP004: Organic Matter									
Organic Matter	----	0.5	%		**0.7**	**0.6**	**1.0**	**0.9**	**0.8**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD329_210608	0089_QC104_210608	0089_SD358_210608	0089_QC108_210608	0089_SD330_210608
				Sampling date / time	08-Jun-2021 09:27	08-Jun-2021 09:39	08-Jun-2021 10:02	08-Jun-2021 10:04	08-Jun-2021 10:27
Compound	CAS Number	LOR	Unit		EP2106466-001	EP2106466-002	EP2106466-003	EP2106466-004	EP2106466-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD329_210608	0089_QC104_210608	0089_SD358_210608	0089_QC108_210608	0089_SD330_210608
				Sampling date / time	08-Jun-2021 09:27	08-Jun-2021 09:39	08-Jun-2021 10:02	08-Jun-2021 10:04	08-Jun-2021 10:27
Compound	CAS Number	LOR	Unit		EP2106466-001	EP2106466-002	EP2106466-003	EP2106466-004	EP2106466-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**112**	**91.0**	**99.5**	**105**	**110**
13C8-PFOA	----	0.0002	%		**93.0**	**97.0**	**106**	**95.0**	**97.5**

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD352_210608	0089_SD331_210608	0089_SD356_210608	0089_SD335_210608	0089_SD364_210608
				Sampling date / time	08-Jun-2021 10:45	08-Jun-2021 11:34	08-Jun-2021 11:55	08-Jun-2021 13:09	08-Jun-2021 13:13
					EP2106466-006	EP2106466-007	EP2106466-008	EP2106466-009	EP2106466-010
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**9.0**	**9.2**	**9.1**	**9.1**	**9.0**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**41800**	**24200**	**33500**	**34100**	**33700**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**31.7**	**22.0**	**21.4**	**23.3**	**25.7**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**3.4**	**2.9**	**10.0**	**5.4**	**4.9**
Exchangeable Magnesium	----	0.1	meq/100g		**0.4**	**0.3**	**0.9**	**0.5**	**0.5**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		<0.1	**0.1**	**0.2**	**0.1**	**0.1**
Cation Exchange Capacity	----	0.1	meq/100g		**3.8**	**3.3**	**11.0**	**6.0**	**5.6**
Exchangeable Sodium Percent	----	0.1	%		**2.4**	**3.1**	**1.7**	**2.0**	**2.3**
EP004: Organic Matter									
Organic Matter	----	0.5	%		**1.2**	**1.2**	**1.2**	**0.8**	**1.0**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD352_210608	0089_SD331_210608	0089_SD356_210608	0089_SD335_210608	0089_SD364_210608
				Sampling date / time	08-Jun-2021 10:45	08-Jun-2021 11:34	08-Jun-2021 11:55	08-Jun-2021 13:09	08-Jun-2021 13:13
Compound	CAS Number	LOR	Unit		EP2106466-006	EP2106466-007	EP2106466-008	EP2106466-009	EP2106466-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD352_210608	0089_SD331_210608	0089_SD356_210608	0089_SD335_210608	0089_SD364_210608
				Sampling date / time	08-Jun-2021 10:45	08-Jun-2021 11:34	08-Jun-2021 11:55	08-Jun-2021 13:09	08-Jun-2021 13:13
Compound	CAS Number	LOR	Unit		EP2106466-006	EP2106466-007	EP2106466-008	EP2106466-009	EP2106466-010
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**106**	**108**	**106**	**100**	**100**
13C8-PFOA	----	0.0002	%		**98.0**	**102**	**102**	**99.5**	**96.5**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD350_210608	0089_SD401_210608	0089_SD380_210608	0089_SD351_210608	0089_SD381_210608
			Sampling date / time	08-Jun-2021 15:44	08-Jun-2021 15:46	08-Jun-2021 15:50	08-Jun-2021 15:52	08-Jun-2021 15:55
Compound	CAS Number	LOR	Unit	EP2106466-011	EP2106466-012	EP2106466-013	EP2106466-014	EP2106466-015
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	9.4	9.3	9.3	9.2	9.3
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	1810	24600	28600	29200	1800
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	11.2	17.6	20.5	16.5	14.4
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	4.8	4.8	5.2	4.7	4.8
Exchangeable Magnesium	----	0.1	meq/100g	0.5	0.5	0.6	0.5	0.5
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.2	0.2	0.2
Cation Exchange Capacity	----	0.1	meq/100g	5.5	5.5	6.0	5.4	5.4
Exchangeable Sodium Percent	----	0.1	%	3.3	3.2	3.0	3.2	3.1
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.6	<0.5	0.8	<0.5	<0.5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0003	0.0003	0.0003	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD350_210608	0089_SD401_210608	0089_SD380_210608	0089_SD351_210608	0089_SD381_210608
				Sampling date / time	08-Jun-2021 15:44	08-Jun-2021 15:46	08-Jun-2021 15:50	08-Jun-2021 15:52	08-Jun-2021 15:55
Compound	CAS Number	LOR	Unit		EP2106466-011	EP2106466-012	EP2106466-013	EP2106466-014	EP2106466-015
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0003**	**0.0003**	**0.0003**	**0.0003**	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD350_210608	0089_SD401_210608	0089_SD380_210608	0089_SD351_210608	0089_SD381_210608
				Sampling date / time	08-Jun-2021 15:44	08-Jun-2021 15:46	08-Jun-2021 15:50	08-Jun-2021 15:52	08-Jun-2021 15:55
Compound	CAS Number	LOR	Unit		EP2106466-011	EP2106466-012	EP2106466-013	EP2106466-014	EP2106466-015
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0003**	**0.0003**	**0.0003**	**0.0003**	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0003**	**0.0003**	**0.0003**	**0.0003**	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**104**	**102**	**114**	**114**	**102**
13C8-PFOA	----	0.0002	%		**99.0**	**96.5**	**99.5**	**100**	**97.0**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD352_210608	----	----	----	----
			Sampling date / time	08-Jun-2021 15:58	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2106466-016	--------	--------	--------	--------
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.3**	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**24400**	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**15.2**	----	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**10.3**	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.9**	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**11.4**	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**1.9**	----	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD352_210608	----	----	----	----
				Sampling date / time	08-Jun-2021 15:58	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2106466-016	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	----	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)				Sample ID	**0089_SD352_210608**	**----**	**----**	**----**	**----**
			Sampling date / time		08-Jun-2021 15:58	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2106466-016**	**--------**	**--------**	**--------**	**--------**
					Result	----	----	----	----
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	**----**	**----**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	**----**	**----**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**108**	**----**	**----**	**----**	**----**
13C8-PFOA	----	0.0002	%		**101**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106466**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23829	Issue Date	: 18-Jun-2021
Sampler	: [redacted], [redacted]		
Site	: ah DEF19009/Stirling SED		
Quote number	: SY/139/19		
No. of samples received	: 16		
No. of samples analysed	: 16		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3732248)									
EP2106449-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.0	9.1	0.0	0% - 20%
EP2106466-006	0089_SD352_210608	EA002: pH Value	----	0.1	pH Unit	9.0	9.1	0.0	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3732247)									
EP2106449-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	35400	35100	0.9	0% - 20%
EP2106466-006	0089_SD352_210608	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	41800	41700	0.2	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3733956)									
EP2106466-001	0089_SD329_210608	EA055: Moisture Content	----	0.1	%	22.2	22.2	0.0	0% - 20%
EP2106466-010	0089_SD364_210608	EA055: Moisture Content	----	0.1	%	25.7	26.9	4.5	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3732257)									
EP2106449-001	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	2.1	2.0	5.6	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	5.2	6.3	19.1	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.6	0.7	0.0	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.1	0.1	0.0	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	6.0	7.2	18.4	0% - 20%
EP2106466-006	0089_SD352_210608	ED008: Exchangeable Sodium Percent	----	0.1	%	2.4	2.6	7.2	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	3.4	3.2	4.3	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.4	0.0	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	3.8	3.7	3.9	0% - 20%
EP004: Organic Matter (QC Lot: 3733938)									
EP2106466-001	0089_SD329_210608	EP004: Organic Matter	----	0.5	%	0.7	<0.5	32.8	No Limit
EP2106466-011	0089_SD350_210608	EP004: Organic Matter	----	0.5	%	0.6	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3740899)									
EP2106449-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2106466-007	0089_SD331_210608	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3740904)									
EP2106466-009	0089_SD335_210608	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2106518-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0004	0.0004	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3740899)									
EP2106449-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2106466-007	0089_SD331_210608	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3740899) - continued									
EP2106466-007	0089_SD331_210608	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3740904)									
EP2106466-009	0089_SD335_210608	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2106518-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740899)									
EP2106449-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740899) - continued									
EP2106449-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106466-007	0089_SD331_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740904)									
EP2106466-009	0089_SD335_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106518-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740904) - continued									
EP2106518-003	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3740899)									
EP2106449-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106466-007	0089_SD331_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3740904)									
EP2106466-009	0089_SD335_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106518-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3732248)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	70.0	130
				----	7 pH Unit	99.1	70.0	130
EA010: Conductivity (1:5) (QCLot: 3732247)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	12890 µS/cm	99.3	93.6	106
ED008: Exchangeable Cations (QCLot: 3732257)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	88.5	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	85.5	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	98.3	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	92.9	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	88.8	79.9	110
EP004: Organic Matter (QCLot: 3733938)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	77.0	70.0	120
				<0.5	85 %	85.3	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740899)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.4	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740904)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.8	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740899)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	89.5	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	133

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740899) - continued								
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.6	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	108	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740904)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	94.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	110	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740899)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	114	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	112	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.8	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740904)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	112	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.1	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.6	65.1	134

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740904) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740899)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	82.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	92.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	101	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	113	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740904)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	100	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	111	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	107	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740899)							
EP2106449-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	88.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	95.6	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	85.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	91.6	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	86.8	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	82.8	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740904)							
EP2106466-009	0089_SD335_210608	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	88.0	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	92.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	92.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	90.4	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	86.8	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	96.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740899)							
EP2106449-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	92.6	71.0	135

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740899) - continued							
EP2106449-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	94.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	109	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	99.2	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	109	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	111	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	100	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	89.6	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	108	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740904)							
EP2106466-009	0089_SD335_210608	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	93.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	97.2	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	95.2	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	96.8	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	96.4	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	89.2	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	92.4	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	95.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	106	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	96.0	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	111	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740899)							
EP2106449-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	101	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	112	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	114	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	112	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	102	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	94.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	97.2	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740904)							
EP2106466-009	0089_SD335_210608	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	122	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	110	71.6	129

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740904) - continued							
EP2106466-009	0089_SD335_210608	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	105	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	97.6	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	99.8	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	82.0	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	97.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740899)							
EP2106449-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	91.6	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	88.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	99.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	109	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740904)							
EP2106466-009	0089_SD335_210608	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	94.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	99.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	118	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	120	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106466**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: ah DEF19009/Stirling SED	Issue Date	: 18-Jun-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 16
Order number	: DEF19009/730	No. of samples analysed	: 16

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002)								
0089_SD329_210608,	0089_QC104_210608,	**08-Jun-2021**	**14-Jun-2021**	15-Jun-2021	✓	**14-Jun-2021**	14-Jun-2021	✓
0089_SD358_210608,	0089_QC108_210608,							
0089_SD330_210608,	0089_SD352_210608,							
0089_SD331_210608,	0089_SD356_210608,							
0089_SD335_210608,	0089_SD364_210608,							
0089_SD350_210608,	0089_SD401_210608,							
0089_SD380_210608,	0089_SD351_210608,							
0089_SD381_210608,	0089_SD352_210608							
EA010: Conductivity (1:5)								
Soil Glass Jar - Unpreserved (EA010)								
0089_SD329_210608,	0089_QC104_210608,	**08-Jun-2021**	**14-Jun-2021**	15-Jun-2021	✓	**14-Jun-2021**	12-Jul-2021	✓
0089_SD358_210608,	0089_QC108_210608,							
0089_SD330_210608,	0089_SD352_210608,							
0089_SD331_210608,	0089_SD356_210608,							
0089_SD335_210608,	0089_SD364_210608,							
0089_SD350_210608,	0089_SD401_210608,							
0089_SD380_210608,	0089_SD351_210608,							
0089_SD381_210608,	0089_SD352_210608							
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
0089_SD329_210608,	0089_QC104_210608,	**08-Jun-2021**	**----**	----	----	**14-Jun-2021**	22-Jun-2021	✓
0089_SD358_210608,	0089_QC108_210608,							
0089_SD330_210608,	0089_SD352_210608,							
0089_SD331_210608,	0089_SD356_210608,							
0089_SD335_210608,	0089_SD364_210608,							
0089_SD350_210608,	0089_SD401_210608,							
0089_SD380_210608,	0089_SD351_210608,							
0089_SD381_210608,	0089_SD352_210608							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD329_210608, 0089_QC104_210608,	**08-Jun-2021**	**15-Jun-2021**	06-Jul-2021	✓	**15-Jun-2021**	06-Jul-2021	✓
0089_SD358_210608, 0089_QC108_210608,							
0089_SD330_210608, 0089_SD352_210608,							
0089_SD331_210608, 0089_SD356_210608,							
0089_SD335_210608, 0089_SD364_210608,							
0089_SD350_210608, 0089_SD401_210608,							
0089_SD380_210608, 0089_SD351_210608,							
0089_SD381_210608, 0089_SD352_210608							
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD329_210608, 0089_QC104_210608,	**08-Jun-2021**	**15-Jun-2021**	06-Jul-2021	✓	**15-Jun-2021**	06-Jul-2021	✓
0089_SD358_210608, 0089_QC108_210608,							
0089_SD330_210608, 0089_SD352_210608,							
0089_SD331_210608, 0089_SD356_210608,							
0089_SD335_210608, 0089_SD364_210608,							
0089_SD350_210608, 0089_SD401_210608,							
0089_SD380_210608, 0089_SD351_210608,							
0089_SD381_210608, 0089_SD352_210608							
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD329_210608, 0089_QC104_210608,	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
0089_SD358_210608, 0089_QC108_210608,							
0089_SD330_210608, 0089_SD352_210608,							
0089_SD331_210608, 0089_SD356_210608,							
0089_SD335_210608, 0089_SD364_210608,							
0089_SD350_210608, 0089_SD401_210608,							
0089_SD380_210608, 0089_SD351_210608,							
0089_SD381_210608, 0089_SD352_210608							
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD329_210608, 0089_QC104_210608,	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
0089_SD358_210608, 0089_QC108_210608,							
0089_SD330_210608, 0089_SD352_210608,							
0089_SD331_210608, 0089_SD356_210608,							
0089_SD335_210608, 0089_SD364_210608,							
0089_SD350_210608, 0089_SD401_210608,							
0089_SD380_210608, 0089_SD351_210608,							
0089_SD381_210608, 0089_SD352_210608							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X)								
0089_SD329_210608,	0089_QC104_210608,	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
0089_SD358_210608,	0089_QC108_210608,							
0089_SD330_210608,	0089_SD352_210608,							
0089_SD331_210608,	0089_SD356_210608,							
0089_SD335_210608,	0089_SD364_210608,							
0089_SD350_210608,	0089_SD401_210608,							
0089_SD380_210608,	0089_SD351_210608,							
0089_SD381_210608,	0089_SD352_210608							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0089_SD329_210608,	0089_QC104_210608,	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
0089_SD358_210608,	0089_QC108_210608,							
0089_SD330_210608,	0089_SD352_210608,							
0089_SD331_210608,	0089_SD356_210608,							
0089_SD335_210608,	0089_SD364_210608,							
0089_SD350_210608,	0089_SD401_210608,							
0089_SD380_210608,	0089_SD351_210608,							
0089_SD381_210608,	0089_SD352_210608							
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X)								
0089_SD329_210608,	0089_QC104_210608,	**08-Jun-2021**	**17-Jun-2021**	05-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
0089_SD358_210608,	0089_QC108_210608,							
0089_SD330_210608,	0089_SD352_210608,							
0089_SD331_210608,	0089_SD356_210608,							
0089_SD335_210608,	0089_SD364_210608,							
0089_SD350_210608,	0089_SD401_210608,							
0089_SD380_210608,	0089_SD351_210608,							
0089_SD381_210608,	0089_SD352_210608							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106466**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23829	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ah DEF19009/Stirling SED		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 12:45	Issue Date	: 10-Jun-2021
Client Requested Due Date	: 21-Jun-2021	Scheduled Reporting Date	: **21-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 11.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 16 / 16

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2106466-001	08-Jun-2021 09:27	0089_SD329_210608	✓	✓	✓	✓
EP2106466-002	08-Jun-2021 09:39	0089_QC104_210608	✓	✓	✓	✓
EP2106466-003	08-Jun-2021 10:02	0089_SD358_210608	✓	✓	✓	✓
EP2106466-004	08-Jun-2021 10:04	0089_QC108_210608	✓	✓	✓	✓
EP2106466-005	08-Jun-2021 10:27	0089_SD330_210608	✓	✓	✓	✓
EP2106466-006	08-Jun-2021 10:45	0089_SD352_210608	✓	✓	✓	✓
EP2106466-007	08-Jun-2021 11:34	0089_SD331_210608	✓	✓	✓	✓
EP2106466-008	08-Jun-2021 11:55	0089_SD356_210608	✓	✓	✓	✓
EP2106466-009	08-Jun-2021 13:09	0089_SD335_210608	✓	✓	✓	✓
EP2106466-010	08-Jun-2021 13:13	0089_SD364_210608	✓	✓	✓	✓
EP2106466-011	08-Jun-2021 15:44	0089_SD350_210608	✓	✓	✓	✓
EP2106466-012	08-Jun-2021 15:46	0089_SD401_210608	✓	✓	✓	✓
EP2106466-013	08-Jun-2021 15:50	0089_SD380_210608	✓	✓	✓	✓
EP2106466-014	08-Jun-2021 15:52	0089_SD351_210608	✓	✓	✓	✓
EP2106466-015	08-Jun-2021 15:55	0089_SD381_210608	✓	✓	✓	✓
EP2106466-016	08-Jun-2021 15:58	0089_SD352_210608	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2106466

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0089_PFASOTP **Client:** CARDNO **Project Manager:** [redacted]

Phone:)

ALS Compass COC Reference: ~~23850~~ ~~23817~~ 23829 23826 ~~23351~~ 23821 **# Samples:** **Sampler:** [redacted]

Phone:)

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send QC2** (x10) to Eurofins

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
CARDNO	[redacted]		
Date / Time: 9/6/21	Date / Time: 9/6 1245	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: **23829** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD329		08/06/2021 09:27 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_QC104		08/06/2021 09:39 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD358		08/06/2021 10:02 AM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_QC108		08/06/2021 10:04 AM	Soil	ALS: 2 Non ALS: 0	No		X		
005	0089_SD330		08/06/2021 10:27 AM	Soil	ALS: 2 Non ALS: 0	No		X		
006	0089_SD352		08/06/2021 10:45 AM	Soil	ALS: 2 Non ALS: 0	No		X		
007	0089_SD331		08/06/2021 11:34 AM	Soil	ALS: 2 Non ALS: 0	No		X		
008	0089_SD356		08/06/2021 11:55 AM	Soil	ALS: 2 Non ALS: 0	No		X		
009	0089_SD335		08/06/2021 01:09 PM	Soil	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

COC#: 23829 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SD364		08/06/2021 01:13 PM	Soil	ALS: 2 Non ALS: 0	No		X		
011	0089_SD350		08/06/2021 03:44 PM	Soil	ALS: 2 Non ALS: 0	No		X		
012	0089_SD401		08/06/2021 03:46 PM	Soil	ALS: 2 Non ALS: 0	No		X		
013	0089_SD380		08/06/2021 03:50 PM	Soil	ALS: 2 Non ALS: 0	No		X		
014	0089_SD351		08/06/2021 03:52 PM	Soil	ALS: 2 Non ALS: 0	No		X		
015	0089_SD381		08/06/2021 03:55 PM	Soil	ALS: 2 Non ALS: 0	No		X		
016	0089_SD352		08/06/2021 03:58 PM	Soil	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

(ALS) COC#: 23829 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD329	HDPE Soil Jar	200 mL	00620719057217	Grey	No	
001	0089_SD329	Soil Glass Jar - Unpreserved	150 mL	00260121045218	Orange	No	
002	0089_QC104	HDPE Soil Jar	200 mL	00620719057118	Grey	No	
002	0089_QC104	Soil Glass Jar - Unpreserved	150 mL	00260121045248	Orange	No	
003	0089_SD358	HDPE Soil Jar	200 mL	00620719062574	Grey	No	
003	0089_SD358	Soil Glass Jar - Unpreserved	150 mL	00260121034877	Orange	No	
004	0089_QC108	Soil Glass Jar - Unpreserved	150 mL	00260121045290	Orange	No	
004	0089_QC108	HDPE Soil Jar	200 mL	00620719057196	Grey	No	
005	0089_SD330	HDPE Soil Jar	200 mL	00620719057185	Grey	No	
005	0089_SD330	Soil Glass Jar - Unpreserved	150 mL	00260121045300	Orange	No	
006	0089_SD352	HDPE Soil Jar	200 mL	00620719057229	Grey	No	
006	0089_SD352	Soil Glass Jar - Unpreserved	150 mL	00260121045316	Orange	No	
007	0089_SD331	HDPE Soil Jar	200 mL	00620719057213	Grey	No	
007	0089_SD331	Soil Glass Jar - Unpreserved	150 mL	00260121045342	Orange	No	
008	0089_SD356	HDPE Soil Jar	200 mL	00620719057132	Grey	No	
008	0089_SD356	Soil Glass Jar - Unpreserved	150 mL	00260121045347	Orange	No	
009	0089_SD335	Soil Glass Jar - Unpreserved	150 mL	00260121045349	Orange	No	
009	0089_SD335	HDPE Soil Jar	200 mL	00620719057159	Grey	No	
010	0089_SD364	HDPE Soil Jar	200 mL	00620719057122	Grey	No	
010	0089_SD364	Soil Glass Jar - Unpreserved	150 mL	00260121045335	Orange	No	
011	0089_SD350	HDPE Soil Jar	200 mL	00620719057170	Grey	No	
011	0089_SD350	Soil Glass Jar - Unpreserved	150 mL	00260121045344	Orange	No	
012	0089_SD401	HDPE Soil Jar	200 mL	00620719057214	Grey	No	
012	0089_SD401	Soil Glass Jar - Unpreserved	150 mL	00260121045343	Orange	No	
013	0089_SD380	Soil Glass Jar - Unpreserved	150 mL	00260121045261	Orange	No	
013	0089_SD380	HDPE Soil Jar	200 mL	00620719057209	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 23829 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

014	0089_SD351	Soil Glass Jar - Unpreserved	150 mL	00260121045340	Orange	No	
014	0089_SD351	HDPE Soil Jar	200 mL	00620719057188	Grey	No	
015	0089_SD381	Soil Glass Jar - Unpreserved	150 mL	00260121045329	Orange	No	
015	0089_SD381	HDPE Soil Jar	200 mL	00620719057128	Grey	No	
016	0089_SD352	HDPE Soil Jar	200 mL	00620719062506	Grey	No	
016	0089_SD352	Soil Glass Jar - Unpreserved	150 mL	00260121045227	Orange	No	

Total Bottle Count: ALS: 32, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106514**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 17:10
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23886	Issue Date	: 22-Jun-2021 19:42
Sampler	: [redacted]		
Site	: MB DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 11		
No. of samples analysed	: 11		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic Balance out of acceptable limits for sample #6 due to analytes not quantified in this report. Major cations (ED093F) and major anions (ED041G/ED045G) have been confirmed by re-analysis. Sample is high in nitrate.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW197_210609	0089_MW200_210609	0089_MW195S_210609	0089_MW195D_210609	0089_QC112_210609
				Sampling date / time	09-Jun-2021 09:49	09-Jun-2021 09:53	09-Jun-2021 11:17	09-Jun-2021 11:19	09-Jun-2021 11:21
					EP2106514-001	EP2106514-002	EP2106514-003	EP2106514-004	EP2106514-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.84**	**7.89**	**7.79**	**7.81**	**7.83**
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**----**	**5440**	**3180**	**18400**	**18500**
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**----**	**37**	**45**	**187**	**186**
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**506**	**451**	**570**	**224**	**220**
Total Alkalinity as CaCO3	----	1	mg/L		**506**	**451**	**570**	**224**	**220**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**158**	**290**	**343**	**1180**	**1200**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1540**	**2710**	**1170**	**8930**	**9000**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**80**	**125**	**197**	**365**	**371**
Magnesium	7439-95-4	1	mg/L		**170**	**160**	**160**	**719**	**731**
Sodium	7440-23-5	1	mg/L		**895**	**1690**	**679**	**5080**	**5200**
Potassium	7440-09-7	1	mg/L		**55**	**97**	**54**	**253**	**260**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**56.8**	**91.5**	**51.5**	**281**	**283**
ø Total Cations	----	0.01	meq/L		**58.3**	**95.4**	**53.9**	**305**	**312**
ø Ionic Balance	----	0.01	%		**1.28**	**2.09**	**2.26**	**4.08**	**4.75**
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**38**	**3**	**18**	**4**	**8**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW197_210609	0089_MW200_210609	0089_MW195S_210609	0089_MW195D_210609	0089_QC112_210609
				Sampling date / time	09-Jun-2021 09:49	09-Jun-2021 09:53	09-Jun-2021 11:17	09-Jun-2021 11:19	09-Jun-2021 11:21
					EP2106514-001	EP2106514-002	EP2106514-003	EP2106514-004	EP2106514-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**0.01**	**0.02**	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	**0.10**	**0.14**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	**0.08**	**0.11**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	**0.05**	**0.07**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW197_210609	0089_MW200_210609	0089_MW195S_210609	0089_MW195D_210609	0089_QC112_210609
				Sampling date / time	09-Jun-2021 09:49	09-Jun-2021 09:53	09-Jun-2021 11:17	09-Jun-2021 11:19	09-Jun-2021 11:21
					EP2106514-001	EP2106514-002	EP2106514-003	EP2106514-004	EP2106514-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	**2.05**	**2.52**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.02**	**2.30**	**2.86**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.01**	**0.02**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.02**	**2.30**	**2.86**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**108**	**102**	**100**	**100**	**99.9**
13C8-PFOA	----	0.02	%		**99.6**	**100**	**100**	**97.8**	**99.9**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW203_210609	0089_MW217_210609	0089_MW220_210609	0089_MW224_210609	0089_MW282_210609
			Sampling date / time	09-Jun-2021 12:32	09-Jun-2021 13:26	09-Jun-2021 13:28	09-Jun-2021 13:31	09-Jun-2021 13:35
Compound	CAS Number	LOR	Unit	EP2106514-006	EP2106514-007	EP2106514-008	EP2106514-009	EP2106514-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.75	7.80	----	8.09	7.73
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	564	472	----	504	850
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	33	60	----	121	375
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	274	240	----	216	571
Total Alkalinity as CaCO3	----	1	mg/L	274	240	----	216	571
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	52	15	----	39	24
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	45	52	----	112	89
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	87	105	----	64	195
Magnesium	7439-95-4	1	mg/L	41	11	----	21	30
Sodium	7440-23-5	1	mg/L	51	34	----	88	63
Potassium	7440-09-7	1	mg/L	5	3	----	4	2
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	7.83	6.57	----	8.29	14.4
ø Total Cations	----	0.01	meq/L	10.1	7.70	----	8.85	15.0
ø Ionic Balance	----	0.01	%	12.5	7.89	----	3.30	1.94
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	6	1	----	1	37
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.18	<0.02	4.89
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.17	<0.02	7.83
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.09	<0.02	3.61	<0.02	42.7
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.46	<0.02	3.15

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW203_210609	0089_MW217_210609	0089_MW220_210609	0089_MW224_210609	0089_MW282_210609
				Sampling date / time	09-Jun-2021 12:32	09-Jun-2021 13:26	09-Jun-2021 13:28	09-Jun-2021 13:31	09-Jun-2021 13:35
Compound	CAS Number	LOR	Unit		EP2106514-006	EP2106514-007	EP2106514-008	EP2106514-009	EP2106514-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.02**	**0.02**	**9.38**	**0.02**	**40.3**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	**1.8**	**0.2**	<0.1	**1.4**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**6.98**	**0.40**	<0.02	**2.75**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**4.33**	**0.55**	<0.02	**16.9**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.70**	**0.19**	<0.02	**2.94**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.38**	**0.60**	<0.01	**4.50**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	**0.02**	<0.02	<0.02	**0.02**
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW203_210609	0089_MW217_210609	0089_MW220_210609	0089_MW224_210609	0089_MW282_210609
				Sampling date / time	09-Jun-2021 12:32	09-Jun-2021 13:26	09-Jun-2021 13:28	09-Jun-2021 13:31	09-Jun-2021 13:35
					EP2106514-006	EP2106514-007	EP2106514-008	EP2106514-009	EP2106514-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	**32.6**	**0.15**	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	**0.29**	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.11**	**47.1**	**15.9**	**0.02**	**127**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.11**	**0.02**	**13.0**	**0.02**	**83.0**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.11**	**47.1**	**15.3**	**0.02**	**116**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	**104**	**99.6**	**95.9**	**77.2**
13C8-PFOA	----	0.02	%		**97.5**	**88.7**	**90.2**	**89.6**	**91.8**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW216_210609	----	----	----	----
				Sampling date / time	09-Jun-2021 13:48	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2106514-011	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.88	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		1080	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		252	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		310	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		310	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		70	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		361	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		144	----	----	----	----
Magnesium	7439-95-4	1	mg/L		40	----	----	----	----
Sodium	7440-23-5	1	mg/L		154	----	----	----	----
Potassium	7440-09-7	1	mg/L		7	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		17.8	----	----	----	----
ø Total Cations	----	0.01	meq/L		17.4	----	----	----	----
ø Ionic Balance	----	0.01	%		1.36	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		11	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.51	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.53	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		3.50	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		0.15	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW216_210609	----	----	----	----
				Sampling date / time	09-Jun-2021 13:48	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2106514-011	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**1.07**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.9**	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**3.57**	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**1.85**	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.38**	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.39**	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW216_210609	----	----	----	----
				Sampling date / time	09-Jun-2021 13:48	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2106514-011	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**3.81**	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**16.7**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**4.57**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**16.0**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**107**	----	----	----	----
13C8-PFOA	----	0.02	%		**91.9**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106514**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23886	Issue Date	: 22-Jun-2021
Sampler	: [redacted]		
Site	: MB DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 11		
No. of samples analysed	: 11		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3747182)									
EP2106514-002	0089_MW200_210609	EA005-P: pH Value	----	0.01	pH Unit	7.89	7.87	0.3	0% - 20%
EP2106515-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.81	7.77	0.5	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3738044)									
EP2106494-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	86400	85200	1.4	0% - 20%
EP2106514-007	0089_MW217_210609	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	472	469	0.6	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3738046)									
EP2106514-010	0089_MW282_210609	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	850	841	1.1	0% - 20%
EP2106519-005	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37600	37700	0.3	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3738045)									
EP2106514-002	0089_MW200_210609	EA025H: Suspended Solids (SS)	----	5	mg/L	37	43	14.4	No Limit
EP2106516-006	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	107	101	5.5	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3738047)									
EP2106514-010	0089_MW282_210609	EA025H: Suspended Solids (SS)	----	5	mg/L	375	418	10.7	0% - 20%
EP2106519-007	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	20	24	16.1	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3747181)									
EP2106514-002	0089_MW200_210609	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	451	441	2.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	451	441	2.2	0% - 20%
EP2106515-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	435	431	1.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	435	431	1.1	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734684)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734684) - continued									
EP2106514-001	0089_MW197_210609	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	158	159	0.0	0% - 20%
EP2106579-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	7	7	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3734685)									
EP2106514-001	0089_MW197_210609	ED045G: Chloride	16887-00-6	1	mg/L	1540	1520	0.6	0% - 20%
EP2106579-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	184	184	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3731487)									
EP2106514-002	0089_MW200_210609	ED093F: Calcium	7440-70-2	1	mg/L	125	122	2.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	160	157	2.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1690	1660	1.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	97	95	2.2	0% - 20%
EP2106516-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	121	125	3.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	46	48	4.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	128	133	3.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	19	20	0.0	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 3734109)									
EP2106514-001	0089_MW197_210609	ED093F: Calcium	7440-70-2	1	mg/L	80	83	3.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	170	176	3.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	895	934	4.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	55	58	4.8	0% - 20%
EP2106618-009	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	1680	1770	5.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1360	1420	4.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	16100	16800	4.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	618	647	4.6	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3736802)									
EP2106514-001	0089_MW197_210609	EP005: Total Organic Carbon	----	1	mg/L	38	38	0.0	No Limit
EP2106515-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	5	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3747182)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3738044)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	106	88.1	114
				<10	1000 mg/L	102	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3738046)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	100	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3738045)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	94.2	89.1	120
				<5	1000 mg/L	101	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3738047)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	99.5	89.1	120
				<5	1000 mg/L	101	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3747181)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	102	81.2	126
				<1	200 mg/L	92.4	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734684)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.3	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3734685)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.7	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3731487)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.5	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3734109)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.3	85.9	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3734109) - continued								
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.2	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.8	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3736802)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	99.1	87.2	116
				<1	100 mg/L	103	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3745334)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	114	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	92.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	108	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	96.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3745334)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	98.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	123	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	123	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	123	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	121	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	133	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	135	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	110	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3745334)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	101	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	114	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	105	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	112	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	118	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	131	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	107	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3745334)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3745334) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	129	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	140	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	133	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	136	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734684)							
EP2106514-001	0089_MW197_210609	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	108	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3734685)							
EP2106514-001	0089_MW197_210609	ED045G: Chloride	16887-00-6	1000 mg/L	99.2	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3736802)							
EP2106514-002	0089_MW200_210609	EP005: Total Organic Carbon	----	100 mg/L	107	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106514**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: MB DEF19009/Stirling GW	Issue Date	: 22-Jun-2021
Sampler	: [redacted]	No. of samples received	: 11
Order number	: DEF19009/730	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	----	----	----	21-Jun-2021	09-Jun-2021	**12**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**----**	----	----	**21-Jun-2021**	09-Jun-2021	×

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**----**	----	----	**16-Jun-2021**	16-Jun-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**----**	----	----	**16-Jun-2021**	16-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**----**	----	----	**21-Jun-2021**	23-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**----**	----	----	**21-Jun-2021**	07-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**----**	----	----	**21-Jun-2021**	07-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**----**	----	----	**15-Jun-2021**	16-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**----**	----	----	**15-Jun-2021**	07-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW220_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW220_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW220_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW220_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW197_210609, 0089_MW200_210609, 0089_MW195S_210609, 0089_MW195D_210609, 0089_QC112_210609, 0089_MW203_210609, 0089_MW217_210609, 0089_MW220_210609, 0089_MW224_210609, 0089_MW282_210609, 0089_MW216_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106514**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23886	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: MB DEF19009/Stirling GW		
Sampler	: [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 17:10	Issue Date	: 11-Jun-2021
Client Requested Due Date	: 23-Jun-2021	Scheduled Reporting Date	: **23-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 5	Temperature	: 15.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 11 / 11

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106514-001	09-Jun-2021 09:49	0089_MW197_210609	✓		✓	✓	✓	✓	✓
EP2106514-002	09-Jun-2021 09:53	0089_MW200_210609	✓	✓	✓	✓	✓	✓	✓
EP2106514-003	09-Jun-2021 11:17	0089_MW195S_210609	✓	✓	✓	✓	✓	✓	✓
EP2106514-004	09-Jun-2021 11:19	0089_MW195D_210609	✓	✓	✓	✓	✓	✓	✓
EP2106514-005	09-Jun-2021 11:21	0089_QC112_210609	✓	✓	✓	✓	✓	✓	✓
EP2106514-006	09-Jun-2021 12:32	0089_MW203_210609	✓	✓	✓	✓	✓	✓	✓
EP2106514-007	09-Jun-2021 13:26	0089_MW217_210609	✓	✓	✓	✓	✓	✓	✓
EP2106514-008	09-Jun-2021 13:28	0089_MW220_210609					✓		
EP2106514-009	09-Jun-2021 13:31	0089_MW224_210609	✓	✓	✓	✓	✓	✓	✓
EP2106514-010	09-Jun-2021 13:35	0089_MW282_210609	✓	✓	✓	✓	✓	✓	✓
EP2106514-011	09-Jun-2021 13:48	0089_MW216_210609	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level
EP2106514-002	09-Jun-2021 09:53	0089_MW200_210609	✓
EP2106514-003	09-Jun-2021 11:17	0089_MW195S_210609	✓
EP2106514-004	09-Jun-2021 11:19	0089_MW195D_210609	✓
EP2106514-005	09-Jun-2021 11:21	0089_QC112_210609	✓
EP2106514-006	09-Jun-2021 12:32	0089_MW203_210609	✓
EP2106514-007	09-Jun-2021 13:26	0089_MW217_210609	✓
EP2106514-009	09-Jun-2021 13:31	0089_MW224_210609	✓
EP2106514-010	09-Jun-2021 13:35	0089_MW282_210609	✓
EP2106514-011	09-Jun-2021 13:48	0089_MW216_210609	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]cardno.com.au

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

ALSCompass
SAMPLING *Intelligence*

Environmental Division
Perth
Work Order Reference
EP2106514

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_C089_PFASOTP **Client:** CARDNO

Project Manager [redacted]

Phone:)

23886 23915 23896 23898 23900

ALS Compass COC Reference: 23914 **# Samples:** 23899

Sampler: [redacted]

Phone:)

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send QC211 & QC212 to Eurofins

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
CARDNO	[redacted]		
Date / Time: 9/6/21	Date / Time: 1710 9/6/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: **23886** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW197		09/06/2021 09:49 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW200		09/06/2021 09:53 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW195S		09/06/2021 11:17 AM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8	X		extra PFAS bottles for lab QC
004	0089_MW195D		09/06/2021 11:19 AM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8	X		extra PFAS bottles for lab QC
005	0089_QC112		09/06/2021 11:21 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
006	0089_MW203		09/06/2021 12:32 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
007	0089_MW217		09/06/2021 01:26 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
008	0089_MW220		09/06/2021 01:28 PM	Water	ALS: 2 Non ALS: 0	No	Partial 1/8			
009	0089_MW224		09/06/2021 01:31 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

ALS COC#: **23886** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW282		09/06/2021 01:35 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
011	0089_MW216		09/06/2021 01:48 PM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8	X		extra PFAS bottles for lab QC

CHAIN OF CUSTODY

COC#: **23886** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW197	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW200	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW195S	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW195D	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_QC112	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **23886** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW203	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW217	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW220	Ground Waters WATER	Water	- EP231X PFAS - Full Suite (28 analytes)
009	0089_MW224	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_MW282	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_MW216	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23886 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW197	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016800	Purple	No	
001	0089_MW197	HDPE (no PTFE)	20 mL	00350019151302	Grey	No	
001	0089_MW197	HDPE (no PTFE)	20 mL	00350019151131	Grey	No	
001	0089_MW197	Clear Plastic Bottle - Natural	250 mL	00070220025238	Green	No	
001	0089_MW197	Clear Plastic Bottle - Natural	250 mL	00070220025233	Green	No	
002	0089_MW200	Clear Plastic Bottle - Natural	250 mL	00070220025246	Green	No	
002	0089_MW200	Clear Plastic Bottle - Natural	250 mL	00070220025287	Green	No	
002	0089_MW200	HDPE (no PTFE)	20 mL	00350019151361	Grey	No	
002	0089_MW200	HDPE (no PTFE)	20 mL	00350019151319	Grey	No	
002	0089_MW200	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016866	Purple	No	
003	0089_MW195S	HDPE (no PTFE)	20 mL	00350019151183	Grey	No	
003	0089_MW195S	HDPE (no PTFE)	20 mL	00352010040468	Grey	No	
003	0089_MW195S	Clear Plastic Bottle - Natural	250 mL	00070220025601	Green	No	
003	0089_MW195S	Clear Plastic Bottle - Natural	250 mL	00070220025223	Green	No	
003	0089_MW195S	HDPE (no PTFE)	20 mL	00350019150778	Grey	No	
003	0089_MW195S	HDPE (no PTFE)	20 mL	00352010040434	Grey	No	
003	0089_MW195S	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014310	Purple	No	
004	0089_MW195D	Clear Plastic Bottle - Natural	250 mL	00070220025167	Green	No	
004	0089_MW195D	Clear Plastic Bottle - Natural	250 mL	00070220025212	Green	No	
004	0089_MW195D	HDPE (no PTFE)	20 mL	00350019150864	Grey	No	
004	0089_MW195D	HDPE (no PTFE)	20 mL	00350019164377	Grey	No	
004	0089_MW195D	HDPE (no PTFE)	20 mL	00350019164229	Grey	No	
004	0089_MW195D	HDPE (no PTFE)	20 mL	00350019151266	Grey	No	
004	0089_MW195D	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016803	Purple	No	
005	0089_QC112	Clear Plastic Bottle - Natural	250 mL	00070220025194	Green	No	
005	0089_QC112	HDPE (no PTFE)	20 mL	00350019151157	Grey	No	

CHAIN OF CUSTODY

COC#: **23886** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

005	0089_QC112	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016857	Purple	No	
005	0089_QC112	HDPE (no PTFE)	20 mL	00350019151191	Grey	No	
006	0089_MW203	Clear Plastic Bottle - Natural	250 mL	00070220025358	Green	No	
006	0089_MW203	Clear Plastic Bottle - Natural	250 mL	00070220025311	Green	No	
006	0089_MW203	HDPE (no PTFE)	20 mL	00350019151246	Grey	No	
006	0089_MW203	HDPE (no PTFE)	20 mL	00350019151260	Grey	No	
006	0089_MW203	Amber TOC Vial - Sulfuric Acid	40 mL	00181020004279	Purple	No	
007	0089_MW217	Clear Plastic Bottle - Natural	250 mL	00070220025221	Green	No	
007	0089_MW217	Clear Plastic Bottle - Natural	250 mL	00070220025301	Green	No	
007	0089_MW217	HDPE (no PTFE)	20 mL	00350019150777	Grey	No	
007	0089_MW217	HDPE (no PTFE)	20 mL	00350019150795	Grey	No	
007	0089_MW217	Amber TOC Vial - Sulfuric Acid	40 mL	00181020004318	Purple	No	
008	0089_MW220	HDPE (no PTFE)	20 mL	00350019151121	Grey	No	
008	0089_MW220	HDPE (no PTFE)	20 mL	00350019150875	Grey	No	
009	0089_MW224	HDPE (no PTFE)	20 mL	00350019151276	Grey	No	
009	0089_MW224	HDPE (no PTFE)	20 mL	00350019150827	Grey	No	
009	0089_MW224	Clear Plastic Bottle - Natural	250 mL	00070220025305	Green	No	
009	0089_MW224	Clear Plastic Bottle - Natural	250 mL	00070220025184	Green	No	
009	0089_MW224	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016845	Purple	No	
010	0089_MW282	HDPE (no PTFE)	20 mL	00350019150962	Grey	No	
010	0089_MW282	HDPE (no PTFE)	20 mL	00350019151181	Grey	No	
010	0089_MW282	Clear Plastic Bottle - Natural	250 mL	00070220025220	Green	No	
010	0089_MW282	Clear Plastic Bottle - Natural	250 mL	00070220025268	Green	No	
010	0089_MW282	Amber TOC Vial - Sulfuric Acid	40 mL	00181020004383	Purple	No	
011	0089_MW216	Clear Plastic Bottle - Natural	250 mL	00070220025234	Green	No	
011	0089_MW216	Clear Plastic Bottle - Natural	250 mL	00070220025252	Green	No	
011	0089_MW216	HDPE (no PTFE)	20 mL	00350019163928	Grey	No	

CHAIN OF CUSTODY

(ALS) *COC#:* **23886** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

011	0089_MW216	HDPE (no PTFE)	20 mL	00350019163893	Grey	No	
011	0089_MW216	HDPE (no PTFE)	20 mL	00350019151139	Grey	No	
011	0089_MW216	HDPE (no PTFE)	20 mL	00350019151236	Grey	No	
011	0089_MW216	Amber TOC Vial - Sulfuric Acid	40 mL	00181020004284	Purple	No	

Total Bottle Count: ALS: 57, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106515**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 10-Jun-2021 17:10
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23896	Issue Date	: 22-Jun-2021 22:40
Sampler	: [redacted] [redacted]		
Site	: MG DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 8		
No. of samples analysed	: 8		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW233_210609	0089_MW249_210609	0089_MW516_210609	0089_QC111_210609	0089_MW518_210609
				Sampling date / time	09-Jun-2021 09:04	09-Jun-2021 09:26	09-Jun-2021 10:11	09-Jun-2021 10:48	09-Jun-2021 10:50
Compound	CAS Number	LOR	Unit		EP2106515-001	EP2106515-002	EP2106515-003	EP2106515-004	EP2106515-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.04	7.81	7.66	8.04	8.00
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		186	724	934	1480	1320
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		80	1610	124	140	219
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		121	435	499	362	359
Total Alkalinity as CaCO3	----	1	mg/L		121	435	499	362	359
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		5	25	79	159	160
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		14	150	149	499	412
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		38	91	147	120	112
Magnesium	7439-95-4	1	mg/L		5	35	40	65	59
Sodium	7440-23-5	1	mg/L		15	113	104	254	214
Potassium	7440-09-7	1	mg/L		2	10	15	19	17
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		2.92	13.4	15.8	24.6	22.1
ø Total Cations	----	0.01	meq/L		3.01	12.6	15.5	22.9	20.2
ø Ionic Balance	----	0.01	%		1.60	3.27	0.90	3.68	4.58
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		4	20	28	13	13
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	0.16	0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	0.11	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.08	0.14	1.40	0.02	0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	0.12	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW233_210609	0089_MW249_210609	0089_MW516_210609	0089_QC111_210609	0089_MW518_210609
				Sampling date / time	09-Jun-2021 09:04	09-Jun-2021 09:26	09-Jun-2021 10:11	09-Jun-2021 10:48	09-Jun-2021 10:50
Compound	CAS Number	LOR	Unit		EP2106515-001	EP2106515-002	EP2106515-003	EP2106515-004	EP2106515-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.10**	**0.08**	**9.21**	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	**0.15**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**0.03**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.10**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW233_210609	0089_MW249_210609	0089_MW516_210609	0089_QC111_210609	0089_MW518_210609
				Sampling date / time	09-Jun-2021 09:04	09-Jun-2021 09:26	09-Jun-2021 10:11	09-Jun-2021 10:48	09-Jun-2021 10:50
					EP2106515-001	EP2106515-002	EP2106515-003	EP2106515-004	EP2106515-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.18**	**0.22**	**11.3**	**0.04**	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.18**	**0.22**	**10.6**	**0.02**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.18**	**0.22**	**11.0**	**0.04**	**0.02**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**97.0**	**101**	**98.7**	**106**
13C8-PFOA	----	0.02	%		**90.8**	**90.8**	**89.4**	**89.4**	**90.7**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW264_210609	0089_MW269_210609	0089_MW268_210609	----	----
			Sampling date / time	09-Jun-2021 11:12	09-Jun-2021 11:34	09-Jun-2021 11:49	----	----
Compound	CAS Number	LOR	Unit	EP2106515-006	EP2106515-007	EP2106515-008	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.95	7.94	7.73	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	644	1310	8430	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	176	55	70	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	388	443	413	----	----
Total Alkalinity as CaCO3	----	1	mg/L	388	443	413	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	61	98	728	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	98	470	3770	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	82	73	211	----	----
Magnesium	7439-95-4	1	mg/L	36	66	302	----	----
Sodium	7440-23-5	1	mg/L	92	275	2080	----	----
Potassium	7440-09-7	1	mg/L	14	20	107	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	11.8	24.1	130	----	----
ø Total Cations	----	0.01	meq/L	11.4	21.5	128	----	----
ø Ionic Balance	----	0.01	%	1.60	5.69	0.45	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	12	13	15	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.09	0.05	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.13	0.09	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.06	0.60	0.28	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW264_210609	0089_MW269_210609	0089_MW268_210609	----	----
				Sampling date / time	09-Jun-2021 11:12	09-Jun-2021 11:34	09-Jun-2021 11:49	----	----
Compound	CAS Number	LOR	Unit		EP2106515-006	EP2106515-007	EP2106515-008	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**1.19**	**0.45**	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.02**	**0.03**	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.13**	**0.06**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.01**	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW264_210609	0089_MW269_210609	0089_MW268_210609	----	----
				Sampling date / time	09-Jun-2021 11:12	09-Jun-2021 11:34	09-Jun-2021 11:49	----	----
Compound	CAS Number	LOR	Unit		EP2106515-006	EP2106515-007	EP2106515-008	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**1.27**	**1.44**	**0.48**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**1.25**	**1.05**	**0.28**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**1.27**	**1.31**	**0.39**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**107**	**105**	----	----
13C8-PFOA	----	0.02	%		**88.6**	**89.3**	**91.2**	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106515**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 10-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23896	Issue Date	: 22-Jun-2021
Sampler	: [redacted] [redacted]		
Site	: MG DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 8		
No. of samples analysed	: 8		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3747182)									
EP2106514-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.89	7.87	0.3	0% - 20%
EP2106515-002	0089_MW249_210609	EA005-P: pH Value	----	0.01	pH Unit	7.81	7.77	0.5	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3738028)									
EP2106515-001	0089_MW233_210609	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	186	178	4.1	0% - 50%
EP2106586-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	8160	8150	0.1	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3738029)									
EP2106515-001	0089_MW233_210609	EA025H: Suspended Solids (SS)	----	5	mg/L	80	78	2.9	0% - 50%
EP2106645-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	8	7	15.9	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3747181)									
EP2106514-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	451	441	2.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	451	441	2.2	0% - 20%
EP2106515-002	0089_MW249_210609	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	435	431	1.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	435	431	1.1	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3729883)									
EP2106448-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	25	25	0.0	0% - 20%
EP2106448-011	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1870	1910	2.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3729884)									
EP2106448-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	54	53	0.0	0% - 20%
EP2106448-011	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	14200	14400	1.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3731468)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3731468) - continued									
EP2106450-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	461	457	0.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1460	1450	0.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11400	11400	0.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	602	597	0.7	0% - 20%
EP2106450-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	466	473	1.4	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1480	1500	0.9	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11400	11500	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	630	633	0.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3731469)									
EP2106515-005	0089_MW518_210609	ED093F: Calcium	7440-70-2	1	mg/L	112	115	2.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	59	60	1.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	214	217	1.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	17	17	0.0	0% - 50%
EP2106571-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	29	29	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	25	24	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	238	237	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	11	11	0.0	0% - 50%
EP005: Total Organic Carbon (TOC) (QC Lot: 3736802)									
EP2106514-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	38	38	0.0	No Limit
EP2106515-001	0089_MW233_210609	EP005: Total Organic Carbon	----	1	mg/L	4	5	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3736897)									
EP2106515-002	0089_MW249_210609	EP005: Total Organic Carbon	----	1	mg/L	20	19	0.0	No Limit
EP2106579-003	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	5	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3747182)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3738028)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	104	88.1	114
				<10	1000 mg/L	100	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3738029)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	101	89.1	120
				<5	1000 mg/L	101	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3747181)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	102	81.2	126
				<1	200 mg/L	92.4	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729883)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	87.7	113
				<1	500 mg/L	106	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3729884)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.4	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3731468)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	104	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.9	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.4	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3731469)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.4	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.1	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	90.9	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3736802)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	99.1	87.2	116
				<1	100 mg/L	103	87.2	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 3736897)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	100	87.2	116
				<1	100 mg/L	106	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3745334)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	114	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	92.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	108	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	96.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3745334)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	98.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	111	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	123	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	123	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	123	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	121	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	133	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	135	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	110	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3745334)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	101	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	114	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	105	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	112	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	118	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	131	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	107	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3745334)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	129	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	140	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	133	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	136	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729883)							
EP2106448-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	103	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3729884)							
EP2106448-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	98.8	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3736802)							
EP2106514-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	107	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3736897)							
EP2106515-003	0089_MW516_210609	EP005: Total Organic Carbon	----	100 mg/L	97.1	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106515**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 10-Jun-2021
Site	: MG DEF19009/Stirling GW	Issue Date	: 22-Jun-2021
Sampler	: [redacted]	No. of samples received	: 8
Order number	: DEF19009/730	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW233_210609,	0089_MW249_210609,	----	----	----	21-Jun-2021	09-Jun-2021	**12**
0089_MW516_210609,	0089_QC111_210609,						
0089_MW518_210609,	0089_MW264_210609,						
0089_MW269_210609,	0089_MW268_210609						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_MW233_210609,	0089_MW249_210609,	**09-Jun-2021**	**----**	----	----	**21-Jun-2021**	09-Jun-2021	×
0089_MW516_210609,	0089_QC111_210609,							
0089_MW518_210609,	0089_MW264_210609,							
0089_MW269_210609,	0089_MW268_210609							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_MW233_210609,	0089_MW249_210609,	**09-Jun-2021**	**----**	----	----	**16-Jun-2021**	16-Jun-2021	✓
0089_MW516_210609,	0089_QC111_210609,							
0089_MW518_210609,	0089_MW264_210609,							
0089_MW269_210609,	0089_MW268_210609							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW233_210609, 0089_MW249_210609, 0089_MW516_210609, 0089_QC111_210609, 0089_MW518_210609, 0089_MW264_210609, 0089_MW269_210609, 0089_MW268_210609	**09-Jun-2021**	**----**	----	----	**16-Jun-2021**	16-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW233_210609, 0089_MW249_210609, 0089_MW516_210609, 0089_QC111_210609, 0089_MW518_210609, 0089_MW264_210609, 0089_MW269_210609, 0089_MW268_210609	**09-Jun-2021**	**----**	----	----	**21-Jun-2021**	23-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW233_210609, 0089_MW249_210609, 0089_MW516_210609, 0089_QC111_210609, 0089_MW518_210609, 0089_MW264_210609, 0089_MW269_210609, 0089_MW268_210609	**09-Jun-2021**	**----**	----	----	**21-Jun-2021**	07-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW233_210609, 0089_MW249_210609, 0089_MW516_210609, 0089_QC111_210609, 0089_MW518_210609, 0089_MW264_210609, 0089_MW269_210609, 0089_MW268_210609	**09-Jun-2021**	**----**	----	----	**21-Jun-2021**	07-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW233_210609, 0089_MW249_210609, 0089_MW516_210609, 0089_QC111_210609, 0089_MW518_210609, 0089_MW264_210609, 0089_MW269_210609, 0089_MW268_210609	**09-Jun-2021**	**----**	----	----	**14-Jun-2021**	16-Jun-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW233_210609, 0089_MW249_210609, 0089_MW516_210609, 0089_QC111_210609, 0089_MW518_210609, 0089_MW264_210609, 0089_MW269_210609, 0089_MW268_210609	**09-Jun-2021**	**----**	----	----	**15-Jun-2021**	07-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW233_210609, 0089_MW249_210609, 0089_MW516_210609, 0089_QC111_210609, 0089_MW518_210609, 0089_MW264_210609, 0089_MW269_210609, 0089_MW268_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW233_210609, 0089_MW249_210609, 0089_MW516_210609, 0089_QC111_210609, 0089_MW518_210609, 0089_MW264_210609, 0089_MW269_210609, 0089_MW268_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW233_210609, 0089_MW249_210609, 0089_MW516_210609, 0089_QC111_210609, 0089_MW518_210609, 0089_MW264_210609, 0089_MW269_210609, 0089_MW268_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW233_210609, 0089_MW249_210609, 0089_MW516_210609, 0089_QC111_210609, 0089_MW518_210609, 0089_MW264_210609, 0089_MW269_210609, 0089_MW268_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW233_210609, 0089_MW249_210609, 0089_MW516_210609, 0089_QC111_210609, 0089_MW518_210609, 0089_MW264_210609, 0089_MW269_210609, 0089_MW268_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106515**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23896	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: MG DEF19009/Stirling GW		
Sampler	: [redacted]		

Dates

Date Samples Received	: 10-Jun-2021 17:10	Issue Date	: 10-Jun-2021
Client Requested Due Date	: 23-Jun-2021	Scheduled Reporting Date	: **23-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 5	Temperature	: 15.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 8 / 8

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106515-001	09-Jun-2021 09:04	0089_MW233_210609	✓	✓	✓	✓	✓	✓	✓
EP2106515-002	09-Jun-2021 09:26	0089_MW249_210609	✓	✓	✓	✓	✓	✓	✓
EP2106515-003	09-Jun-2021 10:11	0089_MW516_210609	✓	✓	✓	✓	✓	✓	✓
EP2106515-004	09-Jun-2021 10:48	0089_QC111_210609	✓	✓	✓	✓	✓	✓	✓
EP2106515-005	09-Jun-2021 10:50	0089_MW518_210609	✓	✓	✓	✓	✓	✓	✓
EP2106515-006	09-Jun-2021 11:12	0089_MW264_210609	✓	✓	✓	✓	✓	✓	✓
EP2106515-007	09-Jun-2021 11:34	0089_MW269_210609	✓	✓	✓	✓	✓	✓	✓
EP2106515-008	09-Jun-2021 11:49	0089_MW268_210609	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106515-001	09-Jun-2021 09:04	0089_MW233_210609	✓
EP2106515-002	09-Jun-2021 09:26	0089_MW249_210609	✓
EP2106515-003	09-Jun-2021 10:11	0089_MW516_210609	✓
EP2106515-004	09-Jun-2021 10:48	0089_QC111_210609	✓
EP2106515-005	09-Jun-2021 10:50	0089_MW518_210609	✓
EP2106515-006	09-Jun-2021 11:12	0089_MW264_210609	✓
EP2106515-007	09-Jun-2021 11:34	0089_MW269_210609	✓
EP2106515-008	09-Jun-2021 11:49	0089_MW268_210609	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							

0089_MW233_21060	Clear Plastic Bottle - Natural	----	09-Jun-2021	10-Jun-2021	✘	----	----
0089_MW249_21060	Clear Plastic Bottle - Natural	----	09-Jun-2021	10-Jun-2021	✘	----	----
0089_MW264_21060	Clear Plastic Bottle - Natural	----	09-Jun-2021	10-Jun-2021	✘	----	----
0089_MW268_21060	Clear Plastic Bottle - Natural	----	09-Jun-2021	10-Jun-2021	✘	----	----
0089_MW269_21060	Clear Plastic Bottle - Natural	----	09-Jun-2021	10-Jun-2021	✘	----	----
0089_MW516_21060	Clear Plastic Bottle - Natural	----	09-Jun-2021	10-Jun-2021	✘	----	----
0089_MW518_21060	Clear Plastic Bottle - Natural	----	09-Jun-2021	10-Jun-2021	✘	----	----
0089_QC111_21060	Clear Plastic Bottle - Natural	----	09-Jun-2021	10-Jun-2021	✘	----	----

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2106515

Telephone : -- 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_C089_PFASDTP **Client:** CARDNO **Project Manager:** [redacted]

Phone:)

ALS Compass COC Reference: 23914 **# Samples:** 23899 **Sampler:**

Phone:)

23886 23915 23896 23898 23900

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send QC211 & QC212 to Eurofins

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
CARDNO	[redacted]		
Date / Time: 9/6/21	Date / Time: 1710 9/6/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: **23896** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW233		09/06/2021 09:04 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW249		09/06/2021 09:26 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW516		09/06/2021 10:11 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
004	0089_QC111		09/06/2021 10:48 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
005	0089_MW518		09/06/2021 10:50 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
006	0089_MW264		09/06/2021 11:12 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
007	0089_MW269		09/06/2021 11:34 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
008	0089_MW268		09/06/2021 11:49 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

(ALS) COC#: **23896** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW233	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW249	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW516	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_QC111	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW518	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23896 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW264	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW269	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW268	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23896 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW233	Clear Plastic Bottle - Natural	250 mL	00070220025415	Green	No	
001	0089_MW233	HDPE (no PTFE)	20 mL	00350019151021	Grey	No	
001	0089_MW233	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016776	Purple	No	
001	0089_MW233	HDPE (no PTFE)	20 mL	00350019150776	Grey	No	
001	0089_MW233	Clear Plastic Bottle - Natural	250 mL	00070220025414	Green	No	
002	0089_MW249	Clear Plastic Bottle - Natural	250 mL	00070220025456	Green	No	
002	0089_MW249	HDPE (no PTFE)	20 mL	00352010058923	Grey	No	
002	0089_MW249	HDPE (no PTFE)	20 mL	00352010058947	Grey	No	
002	0089_MW249	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016742	Purple	No	
002	0089_MW249	Clear Plastic Bottle - Natural	250 mL	00070220025538	Green	No	
003	0089_MW516	Clear Plastic Bottle - Natural	250 mL	00070220025333	Green	No	
003	0089_MW516	Clear Plastic Bottle - Natural	250 mL	00070220025326	Green	No	
003	0089_MW516	HDPE (no PTFE)	20 mL	00350019150972	Grey	No	
003	0089_MW516	HDPE (no PTFE)	20 mL	00350019151115	Grey	No	
003	0089_MW516	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016746	Purple	No	
004	0089_QC111	Clear Plastic Bottle - Natural	250 mL	00070220025587	Green	No	
004	0089_QC111	Clear Plastic Bottle - Natural	250 mL	00070220025190	Green	No	
004	0089_QC111	HDPE (no PTFE)	20 mL	00350019150805	Grey	No	
004	0089_QC111	HDPE (no PTFE)	20 mL	00350019150991	Grey	No	
004	0089_QC111	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016802	Purple	No	
005	0089_MW518	HDPE (no PTFE)	20 mL	00350019150968	Grey	No	
005	0089_MW518	Clear Plastic Bottle - Natural	250 mL	00070220025195	Green	No	
005	0089_MW518	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016732	Purple	No	
005	0089_MW518	Clear Plastic Bottle - Natural	250 mL	00070220025188	Green	No	
005	0089_MW518	HDPE (no PTFE)	20 mL	00350019150984	Grey	No	
006	0089_MW264	HDPE (no PTFE)	20 mL	00350019102476	Grey	No	

CHAIN OF CUSTODY

COC#: **23896** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW264	Clear Plastic Bottle - Natural	250 mL	00071018014812	Green	No	
006	0089_MW264	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001171	Purple	No	
006	0089_MW264	HDPE (no PTFE)	20 mL	00350019164151	Grey	No	
007	0089_MW269	Clear Plastic Bottle - Natural	250 mL	00071018014856	Green	No	
007	0089_MW269	HDPE (no PTFE)	20 mL	00350019126799	Grey	No	
007	0089_MW269	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001056	Purple	No	
007	0089_MW269	HDPE (no PTFE)	20 mL	00350019126969	Grey	No	
008	0089_MW268	Clear Plastic Bottle - Natural	250 mL	00071018014857	Green	No	
008	0089_MW268	HDPE (no PTFE)	20 mL	00350019126828	Grey	No	
008	0089_MW268	HDPE (no PTFE)	20 mL	00350019126916	Grey	No	
008	0089_MW268	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001185	Purple	No	

Total Bottle Count: ALS: 37, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106516**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 17:10
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23898	Issue Date	: 22-Jun-2021 12:17
Sampler	: [redacted], [redacted]		
Site	: AH DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.
- EP231X-INJ: The direct injection LCMSMS method may be used where the sample matrix is not suitable for Solid Phase Extraction (e.g. significant particulate load) or where only a single sample container is received.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW289_210609	0089_MW242_210609	0089_MW248_210609	0089_MW261_210609	0089_MW010_210609
				Sampling date / time	09-Jun-2021 09:00	09-Jun-2021 09:25	09-Jun-2021 10:07	09-Jun-2021 10:13	09-Jun-2021 10:32
Compound	CAS Number	LOR	Unit		EP2106516-001	EP2106516-002	EP2106516-003	EP2106516-004	EP2106516-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.12	8.02	7.87	8.11	8.16
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		548	----	934	1690	2600
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		38	----	7	16	32
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		344	188	428	408	431
Total Alkalinity as CaCO3	----	1	mg/L		344	188	428	408	431
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		66	31	179	167	224
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		65	40	141	615	1160
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		93	67	121	143	84
Magnesium	7439-95-4	1	mg/L		30	12	46	59	107
Sodium	7440-23-5	1	mg/L		76	28	128	363	760
Potassium	7440-09-7	1	mg/L		10	4	19	27	51
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		10.1	5.53	16.2	29.0	46.0
ø Total Cations	----	0.01	meq/L		10.7	5.65	15.9	28.5	47.4
ø Ionic Balance	----	0.01	%		2.84	1.08	1.18	0.88	1.46
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		2	1	17	25	9
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.10	<0.02	0.19	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.09	<0.02	0.18	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.51	<0.02	1.48	0.11	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		0.03	<0.02	0.09	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW289_210609	0089_MW242_210609	0089_MW248_210609	0089_MW261_210609	0089_MW010_210609
				Sampling date / time	09-Jun-2021 09:00	09-Jun-2021 09:25	09-Jun-2021 10:07	09-Jun-2021 10:13	09-Jun-2021 10:32
Compound	CAS Number	LOR	Unit		EP2106516-001	EP2106516-002	EP2106516-003	EP2106516-004	EP2106516-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**2.01**	**0.03**	**0.66**	<0.01	**0.02**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.07**	<0.02	**0.25**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**0.06**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.04**	<0.01	**0.13**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW289_210609	0089_MW242_210609	0089_MW248_210609	0089_MW261_210609	0089_MW010_210609
				Sampling date / time	09-Jun-2021 09:00	09-Jun-2021 09:25	09-Jun-2021 10:07	09-Jun-2021 10:13	09-Jun-2021 10:32
					EP2106516-001	EP2106516-002	EP2106516-003	EP2106516-004	EP2106516-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**2.85**	**0.03**	**3.04**	**0.11**	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**2.52**	**0.03**	**2.14**	**0.11**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**2.73**	**0.03**	**2.77**	**0.11**	**0.02**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**92.1**	**92.3**	**95.8**	**90.1**	**85.0**
13C8-PFOA	----	0.02	%		**93.2**	**92.8**	**95.5**	**96.5**	**87.1**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW517_210609	0089_MW257_210609	0089_QC301_210609	0089_QC401_210609	0089_QC302_210609
				Sampling date / time	09-Jun-2021 11:14	09-Jun-2021 11:31	09-Jun-2021 15:08	09-Jun-2021 15:09	09-Jun-2021 15:09
Compound	CAS Number	LOR	Unit		EP2106516-006	EP2106516-007	EP2106516-008	EP2106516-009	EP2106516-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.85	8.21	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		562	243	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		107	134	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		316	158	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		316	158	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		7	8	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		86	16	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		119	57	----	----	----
Magnesium	7439-95-4	1	mg/L		13	6	----	----	----
Sodium	7440-23-5	1	mg/L		68	15	----	----	----
Potassium	7440-09-7	1	mg/L		3	2	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		8.88	3.77	----	----	----
ø Total Cations	----	0.01	meq/L		10.0	4.04	----	----	----
ø Ionic Balance	----	0.01	%		6.11	3.42	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		4	2	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	0.03	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW517_210609	0089_MW257_210609	0089_QC301_210609	0089_QC401_210609	0089_QC302_210609
				Sampling date / time	09-Jun-2021 11:14	09-Jun-2021 11:31	09-Jun-2021 15:08	09-Jun-2021 15:09	09-Jun-2021 15:09
Compound	CAS Number	LOR	Unit		EP2106516-006	EP2106516-007	EP2106516-008	EP2106516-009	EP2106516-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.08**	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.02**	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW517_210609	0089_MW257_210609	0089_QC301_210609	0089_QC401_210609	0089_QC302_210609
				Sampling date / time	09-Jun-2021 11:14	09-Jun-2021 11:31	09-Jun-2021 15:08	09-Jun-2021 15:09	09-Jun-2021 15:09
					EP2106516-006	EP2106516-007	EP2106516-008	EP2106516-009	EP2106516-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.13**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.11**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.13**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**91.3**	**97.7**	**93.9**	**96.5**	**87.6**
13C8-PFOA	----	0.02	%		**89.0**	**84.1**	**92.1**	**94.6**	**86.0**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC402_210609	0089_QC303_210609	0089_QC403_210609	----	----
				Sampling date / time	09-Jun-2021 15:10	09-Jun-2021 15:10	09-Jun-2021 15:11	----	----
Compound	CAS Number	LOR	Unit		EP2106516-011	EP2106516-012	EP2106516-013	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.10	µg/L		<0.10	<0.10	<0.10	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC402_210609	0089_QC303_210609	0089_QC403_210609	----	----
				Sampling date / time	09-Jun-2021 15:10	09-Jun-2021 15:10	09-Jun-2021 15:11	----	----
Compound	CAS Number	LOR	Unit		EP2106516-011	EP2106516-012	EP2106516-013	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	**103**	**95.4**	----	----
13C8-PFOA	----	0.02	%		**106**	**112**	**102**	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106516**	Page	: 1 of 10
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23898	Issue Date	: 22-Jun-2021
Sampler	: [redacted], [redacted]		
Site	: AH DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3741441)									
EP2106513-009	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.71	7.69	0.3	0% - 20%
EP2106494-008	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.56	7.65	1.2	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3738007)									
EP2106516-001	0089_MW289_210609	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	548	546	0.2	0% - 20%
EP2106632-015	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	700	660	6.0	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3738044)									
EP2106494-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	86400	85200	1.4	0% - 20%
EP2106514-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	472	469	0.6	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3738008)									
EP2106516-001	0089_MW289_210609	EA025H: Suspended Solids (SS)	----	5	mg/L	38	36	6.0	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3738045)									
EP2106514-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	37	43	14.4	No Limit
EP2106516-006	0089_MW517_210609	EA025H: Suspended Solids (SS)	----	5	mg/L	107	101	5.5	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3741440)									
EP2106513-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	224	223	0.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	224	223	0.5	0% - 20%
EP2106494-008	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	42	42	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	42	42	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734681)									
EP2106465-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2740	2740	0.1	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734681) - continued									
EP2106465-015	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2600	2520	3.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3734682)									
EP2106465-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19000	19000	0.4	0% - 20%
EP2106465-015	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18600	18600	0.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3731487)									
EP2106514-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	125	122	2.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	160	157	2.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1690	1660	1.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	97	95	2.2	0% - 20%
EP2106516-003	0089_MW248_210609	ED093F: Calcium	7440-70-2	1	mg/L	121	125	3.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	46	48	4.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	128	133	3.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	19	20	0.0	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 3734109)									
EP2106514-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	80	83	3.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	170	176	3.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	895	934	4.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	55	58	4.8	0% - 20%
EP2106618-009	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	1680	1770	5.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1360	1420	4.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	16100	16800	4.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	618	647	4.6	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3734581)									
EP2106465-015	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.0	No Limit
EP2106517-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	86	87	1.2	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3746372)									
EP2106516-011	0089_QC402_210609	EP231X-INJ: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X-INJ: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3746372)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3746372) - continued									
EP2106516-011	0089_QC402_210609	EP231X-INJ: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X-INJ: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.10	<0.10	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3746372)									
EP2106516-011	0089_QC402_210609	EP231X-INJ: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3746372)									
EP2106516-011	0089_QC402_210609	EP231X-INJ: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3746372)									
EP2106516-011	0089_QC402_210609	EP231X-INJ: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X-INJ: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 3746372) - continued									
EP2106516-011	0089_QC402_210609	EP231X-INJ: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3741441)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.5	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3738007)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	101	88.1	114
				<10	1000 mg/L	101	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3738044)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	106	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3738008)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	98.4	89.1	120
				<5	1000 mg/L	101	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3738045)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	94.2	89.1	120
				<5	1000 mg/L	101	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3741440)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	105	81.2	126
				<1	200 mg/L	96.4	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734681)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.2	87.7	113
				<1	500 mg/L	105	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3734682)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.9	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3731487)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.5	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3734109)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.3	85.9	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3734109) - continued								
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.2	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.8	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3734581)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	102	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3742224)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	97.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	95.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	80.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	85.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	100	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	93.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746372)								
EP231X-INJ: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	86.6	72.0	130
EP231X-INJ: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	91.4	71.0	127
EP231X-INJ: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	85.6	68.0	131
EP231X-INJ: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	96.2	69.0	134
EP231X-INJ: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	94.0	65.0	140
EP231X-INJ: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	93.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3742224)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	86.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	98.0	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	84.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	109	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	127	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	129	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	117	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	76.8	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	110	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746372)								
EP231X-INJ: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.10	2.5 µg/L	97.6	73.0	129
EP231X-INJ: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	94.8	72.0	129
EP231X-INJ: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	96.6	72.0	129
EP231X-INJ: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	100	72.0	130
EP231X-INJ: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	98.2	71.0	133

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746372) - continued								
EP231X-INJ: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	95.0	69.0	130
EP231X-INJ: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	104	71.0	129
EP231X-INJ: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	103	69.0	133
EP231X-INJ: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	101	72.0	134
EP231X-INJ: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	94.6	65.0	144
EP231X-INJ: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	102	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3742224)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	105	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	74.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	84.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	108	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	105	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	119	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	108	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746372)								
EP231X-INJ: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	102	67.0	137
EP231X-INJ: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	102	68.0	141
EP231X-INJ: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	101	68.4	127
EP231X-INJ: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	103	64.4	132
EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	95.8	60.2	125
EP231X-INJ: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	97.8	65.0	136
EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	93.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3742224)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	91.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	92.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	76.4	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746372)								
EP231X-INJ: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	94.0	63.0	143
EP231X-INJ: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	95.6	64.0	140

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746372) - continued								
EP231X-INJ: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	101	67.0	138
EP231X-INJ: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	93.4	62.7	135
EP231P: PFAS Sums (QCLot: 3746372)								
EP231X-INJ: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X-INJ: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X-INJ: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734681)							
EP2106465-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3734682)							
EP2106465-005	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3734581)							
EP2106465-016	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	110	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746372)							
EP2106516-011	0089_QC402_210609	EP231X-INJ: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	81.4	72.0	130
		EP231X-INJ: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	84.0	71.0	127
		EP231X-INJ: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	79.6	68.0	131
		EP231X-INJ: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	90.4	69.0	134
		EP231X-INJ: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	86.8	65.0	140
		EP231X-INJ: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746372)							
EP2106516-011	0089_QC402_210609	EP231X-INJ: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	90.8	73.0	129
		EP231X-INJ: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	90.0	72.0	129
		EP231X-INJ: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	92.6	72.0	129
		EP231X-INJ: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	92.0	72.0	130
		EP231X-INJ: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	91.4	71.0	133
		EP231X-INJ: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	87.2	69.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746372) - continued							
EP2106516-011	0089_QC402_210609	EP231X-INJ: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	89.0	71.0	129
		EP231X-INJ: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	91.0	69.0	133
		EP231X-INJ: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	93.6	72.0	134
		EP231X-INJ: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	86.2	65.0	144
		EP231X-INJ: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	95.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746372)							
EP2106516-011	0089_QC402_210609	EP231X-INJ: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	96.0	67.0	137
		EP231X-INJ: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	104	68.0	141
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	97.3	68.5	127
		EP231X-INJ: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	96.2	64.4	132
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	95.8	60.2	125
		EP231X-INJ: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	91.6	65.0	136
		EP231X-INJ: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	88.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746372)							
EP2106516-011	0089_QC402_210609	EP231X-INJ: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	83.0	63.0	143
		EP231X-INJ: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	91.8	64.0	140
		EP231X-INJ: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	91.6	67.0	138
		EP231X-INJ: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	81.0	62.7	135

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106516**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: AH DEF19009/Stirling GW	Issue Date	: 22-Jun-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 13
Order number	: DEF19009/730	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2106465--005	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2106465--005	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW289_210609,	0089_MW242_210609,	----	----	----	17-Jun-2021	09-Jun-2021	**8**
0089_MW248_210609,	0089_MW261_210609,						
0089_MW010_210609,	0089_MW517_210609,						
0089_MW257_210609							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	16	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	16	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW289_210609, 0089_MW242_210609, 0089_MW248_210609, 0089_MW261_210609, 0089_MW010_210609, 0089_MW517_210609, 0089_MW257_210609	**09-Jun-2021**	**----**	----	----	**17-Jun-2021**	09-Jun-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW289_210609, 0089_MW248_210609, 0089_MW261_210609, 0089_MW010_210609, 0089_MW517_210609, 0089_MW257_210609	**09-Jun-2021**	**----**	----	----	**16-Jun-2021**	16-Jun-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW289_210609, 0089_MW248_210609, 0089_MW261_210609, 0089_MW010_210609, 0089_MW517_210609, 0089_MW257_210609	**09-Jun-2021**	**----**	----	----	**16-Jun-2021**	16-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW289_210609, 0089_MW242_210609, 0089_MW248_210609, 0089_MW261_210609, 0089_MW010_210609, 0089_MW517_210609, 0089_MW257_210609	**09-Jun-2021**	**----**	----	----	**17-Jun-2021**	23-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW289_210609, 0089_MW242_210609, 0089_MW248_210609, 0089_MW261_210609, 0089_MW010_210609, 0089_MW517_210609, 0089_MW257_210609	**09-Jun-2021**	**----**	----	----	**21-Jun-2021**	07-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW289_210609, 0089_MW242_210609, 0089_MW248_210609, 0089_MW261_210609, 0089_MW010_210609, 0089_MW517_210609, 0089_MW257_210609	**09-Jun-2021**	**----**	----	----	**21-Jun-2021**	07-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW289_210609, 0089_MW242_210609, 0089_MW248_210609, 0089_MW261_210609, 0089_MW010_210609, 0089_MW517_210609, 0089_MW257_210609	**09-Jun-2021**	**----**	----	----	**15-Jun-2021**	16-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW289_210609, 0089_MW242_210609, 0089_MW248_210609, 0089_MW261_210609, 0089_MW010_210609, 0089_MW517_210609, 0089_MW257_210609	**09-Jun-2021**	**----**	----	----	**14-Jun-2021**	07-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW289_210609, 0089_MW242_210609, 0089_MW248_210609, 0089_MW261_210609, 0089_MW010_210609, 0089_MW517_210609, 0089_MW257_210609, 0089_QC301_210609, 0089_QC401_210609, 0089_QC302_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓
HDPE (no PTFE) (EP231X-INJ)							
0089_QC402_210609, 0089_QC303_210609, 0089_QC403_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW289_210609, 0089_MW242_210609, 0089_MW248_210609, 0089_MW261_210609, 0089_MW010_210609, 0089_MW517_210609, 0089_MW257_210609, 0089_QC301_210609, 0089_QC401_210609, 0089_QC302_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓
HDPE (no PTFE) (EP231X-INJ)							
0089_QC402_210609, 0089_QC303_210609, 0089_QC403_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW289_210609, 0089_MW242_210609, 0089_MW248_210609, 0089_MW261_210609, 0089_MW010_210609, 0089_MW517_210609, 0089_MW257_210609, 0089_QC301_210609, 0089_QC401_210609, 0089_QC302_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓
HDPE (no PTFE) (EP231X-INJ)							
0089_QC402_210609, 0089_QC303_210609, 0089_QC403_210609	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW289_210609,	0089_MW242_210609,	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓
0089_MW248_210609,	0089_MW261_210609,							
0089_MW010_210609,	0089_MW517_210609,							
0089_MW257_210609,	0089_QC301_210609,							
0089_QC401_210609,	0089_QC302_210609							
HDPE (no PTFE) (EP231X-INJ)								
0089_QC402_210609,	0089_QC303_210609,	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓
0089_QC403_210609								
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0089_MW289_210609,	0089_MW242_210609,	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓
0089_MW248_210609,	0089_MW261_210609,							
0089_MW010_210609,	0089_MW517_210609,							
0089_MW257_210609,	0089_QC301_210609,							
0089_QC401_210609,	0089_QC302_210609							
HDPE (no PTFE) (EP231X-INJ)								
0089_QC402_210609,	0089_QC303_210609,	**09-Jun-2021**	**21-Jun-2021**	06-Dec-2021	✓	**21-Jun-2021**	06-Dec-2021	✓
0089_QC403_210609								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	16	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	25	**12.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	25	**16.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	16	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Analytical Methods	Method	Matrix	Method Descriptions
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with mobile phase solvent. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106516**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23898	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: AH DEF19009/Stirling GW		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 17:10	Issue Date	: 18-Jun-2021
Client Requested Due Date	: 21-Jun-2021	Scheduled Reporting Date	: **21-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 5	Temperature	: 15.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106516-001	09-Jun-2021 09:00	0089_MW289_210609	✓	✓	✓	✓	✓	✓	✓
EP2106516-002	09-Jun-2021 09:25	0089_MW242_210609	✓			✓	✓	✓	✓
EP2106516-003	09-Jun-2021 10:07	0089_MW248_210609	✓	✓	✓	✓	✓	✓	✓
EP2106516-004	09-Jun-2021 10:13	0089_MW261_210609	✓	✓	✓	✓	✓	✓	✓
EP2106516-005	09-Jun-2021 10:32	0089_MW010_210609	✓	✓	✓	✓	✓	✓	✓
EP2106516-006	09-Jun-2021 11:14	0089_MW517_210609	✓	✓	✓	✓	✓	✓	✓
EP2106516-007	09-Jun-2021 11:31	0089_MW257_210609	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - EP231X-INJ PFAS - Full Suite (28 analytes)
EP2106516-001	09-Jun-2021 09:00	0089_MW289_210609	✓	
EP2106516-002	09-Jun-2021 09:25	0089_MW242_210609	✓	
EP2106516-003	09-Jun-2021 10:07	0089_MW248_210609	✓	
EP2106516-004	09-Jun-2021 10:13	0089_MW261_210609	✓	
EP2106516-005	09-Jun-2021 10:32	0089_MW010_210609	✓	
EP2106516-006	09-Jun-2021 11:14	0089_MW517_210609	✓	
EP2106516-007	09-Jun-2021 11:31	0089_MW257_210609	✓	
EP2106516-008	09-Jun-2021 15:08	0089_QC301_210609	✓	
EP2106516-009	09-Jun-2021 15:09	0089_QC401_210609	✓	
EP2106516-010	09-Jun-2021 15:09	0089_QC302_210609	✓	
EP2106516-011	09-Jun-2021 15:10	0089_QC402_210609		✓
EP2106516-012	09-Jun-2021 15:10	0089_QC303_210609		✓
EP2106516-013	09-Jun-2021 15:11	0089_QC403_210609		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2106516

Telephone : -- 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_C089_PFASOTP **Client:** CARDNO

Project Manager: [redacted]

Phone:)

ALS Compass COC Reference: 23914 **# Samples:** 23899

23886 23915 23896 23898 23900

Sampler: [redacted]

Phone:)

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send QC211 & QC212 to Eurofins

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
CARDNO	[redacted]		
Date / Time: 9/6/21	Date / Time: 1710 9/6/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: **23898** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW289	extra for qc	09/06/2021 09:00 AM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8		X		
002	0089_MW242		09/06/2021 09:25 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
003	0089_MW248		09/06/2021 10:07 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
004	0089_MW261		09/06/2021 10:13 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
005	0089_MW010		09/06/2021 10:32 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
006	0089_MW517		09/06/2021 11:14 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
007	0089_MW257		09/06/2021 11:31 AM	Water	ALS: 4 Non ALS: 1	No	Partial 7/8		X		
008	0089_QC301		09/06/2021 03:08 PM	Water	ALS: 2 Non ALS: 0	No		X			
009	0089_QC401		09/06/2021 03:09 PM	Water	ALS: 2 Non ALS: 0	No		X			

CHAIN OF CUSTODY

ALS COC#: **23898** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_QC302		09/06/2021 03:09 PM	Water	ALS: 2 Non ALS: 0	No		X			
011	0089_QC402		09/06/2021 03:10 PM	Water	ALS: 2 Non ALS: 0	No		X			
012	0089_QC303		09/06/2021 03:10 PM	Water	ALS: 2 Non ALS: 0	No		X			
013	0089_QC403		09/06/2021 03:11 PM	Water	ALS: 2 Non ALS: 0	No		X			

CHAIN OF CUSTODY

(ALS) COC#: 23898 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW289	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW242	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW248	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW261	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW010	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **23898** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW517	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW257	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23898 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW289	Clear Plastic Bottle - Natural	250 mL	00070220025218	Green	No	
001	0089_MW289	Clear Plastic Bottle - Natural	250 mL	00070220025169	Green	No	
001	0089_MW289	HDPE (no PTFE)	20 mL	00350019151004	Grey	No	
001	0089_MW289	HDPE (no PTFE)	20 mL	00350019151312	Grey	No	
001	0089_MW289	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014362	Purple	No	
001	0089_MW289	HDPE (no PTFE)	20 mL	00352005020475	Grey	No	
001	0089_MW289	HDPE (no PTFE)	20 mL	00352005020568	Grey	No	
002	0089_MW242	Clear Plastic Bottle - Natural	250 mL	00070220025031	Green	No	
002	0089_MW242	HDPE (no PTFE)	20 mL	00350019150850	Grey	No	
002	0089_MW242	Clear Plastic Bottle - Natural	250 mL	00070220025263	Green	No	
002	0089_MW242	HDPE (no PTFE)	20 mL	00350019151093	Grey	No	
002	0089_MW242	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016826	Purple	No	
003	0089_MW248	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016812	Purple	No	
003	0089_MW248	Clear Plastic Bottle - Natural	250 mL	00070220025175	Green	No	
003	0089_MW248	Clear Plastic Bottle - Natural	250 mL	00070220025227	Green	No	
003	0089_MW248	HDPE (no PTFE)	20 mL	00350019150759	Grey	No	
003	0089_MW248	HDPE (no PTFE)	20 mL	00350019150959	Grey	No	
004	0089_MW261	HDPE (no PTFE)	20 mL	00350019150983	Grey	No	
004	0089_MW261	HDPE (no PTFE)	20 mL	00350019150853	Grey	No	
004	0089_MW261	Clear Plastic Bottle - Natural	250 mL	00070220025245	Green	No	
004	0089_MW261	Clear Plastic Bottle - Natural	250 mL	00070220025397	Green	No	
004	0089_MW261	Amber TOC Vial - Sulfuric Acid	40 mL	00181020004328	Purple	No	
005	0089_MW010	Clear Plastic Bottle - Natural	250 mL	00070220025262	Green	No	
005	0089_MW010	Clear Plastic Bottle - Natural	250 mL	00070220025270	Green	No	
005	0089_MW010	HDPE (no PTFE)	20 mL	00350019150947	Grey	No	
005	0089_MW010	HDPE (no PTFE)	20 mL	00350019150773	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 23898 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: AH DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

005	0089_MW010	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016783	Purple	No	
006	0089_MW517	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016820	Purple	No	
006	0089_MW517	HDPE (no PTFE)	20 mL	00350019150900	Grey	No	
006	0089_MW517	HDPE (no PTFE)	20 mL	00350019150855	Grey	No	
006	0089_MW517	Clear Plastic Bottle - Natural	250 mL	00070220025239	Green	No	
006	0089_MW517	Clear Plastic Bottle - Natural	250 mL	00070220025318	Green	No	
007	0089_MW257	HDPE (no PTFE)	20 mL	00350019150943	Grey	No	
007	0089_MW257	HDPE (no PTFE)	20 mL	00350019150880	Grey	No	
007	0089_MW257	Clear Plastic Bottle - Natural	250 mL	00070220025290	Green	No	
007	0089_MW257	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014407	Purple	No	
008	0089_QC301	HDPE (no PTFE)	20 mL	00350019102526	Grey	No	
008	0089_QC301	HDPE (no PTFE)	20 mL	00350019164436	Grey	No	
009	0089_QC401	HDPE (no PTFE)	20 mL	00350019126942	Grey	No	
009	0089_QC401	HDPE (no PTFE)	20 mL	00350019164176	Grey	No	
010	0089_QC302	HDPE (no PTFE)	20 mL	00350019126745	Grey	No	
010	0089_QC302	HDPE (no PTFE)	20 mL	00350019126992	Grey	No	
011	0089_QC402	HDPE (no PTFE)	20 mL	00350019164407	Grey	No	
011	0089_QC402	HDPE (no PTFE)	20 mL	00350019102602	Grey	No	
012	0089_QC303	HDPE (no PTFE)	20 mL	00350019126907	Grey	No	
012	0089_QC303	HDPE (no PTFE)	20 mL	00350019126770	Grey	No	
013	0089_QC403	HDPE (no PTFE)	20 mL	00350019126953	Grey	No	
013	0089_QC403	HDPE (no PTFE)	20 mL	00350019102678	Grey	No	

Total Bottle Count: ALS: 48, Non ALS: 1

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106517**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 17:10
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23899	Issue Date	: 21-Jun-2021 17:40
Sampler	: [redacted]		
Site	: MB DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_SW370_210609	0089_SW416_210609	0089_SW414_210609	0089_SW412_210609	----
			Sampling date / time	09-Jun-2021 09:42	09-Jun-2021 14:47	09-Jun-2021 14:49	09-Jun-2021 14:51	----
Compound	CAS Number	LOR	Unit	EP2106517-001	EP2106517-005	EP2106517-006	EP2106517-007	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.67	8.05	8.10	8.11	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	39100	38400	28200	41700	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	2430	64	23	6	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	166	118	114	116	----
Total Alkalinity as CaCO3	----	1	mg/L	166	118	114	116	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2620	2500	2580	2760	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18500	18200	18700	18600	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	480	492	503	482	----
Magnesium	7439-95-4	1	mg/L	1520	1570	1620	1590	----
Sodium	7440-23-5	1	mg/L	11600	12000	12300	12500	----
Potassium	7440-09-7	1	mg/L	624	645	665	600	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	580	568	583	584	----
ø Total Cations	----	0.01	meq/L	670	692	710	714	----
ø Ionic Balance	----	0.01	%	7.19	9.87	9.81	9.97	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	86	<1	<1	<1	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW370_210609	0089_SW416_210609	0089_SW414_210609	0089_SW412_210609	----
				Sampling date / time	09-Jun-2021 09:42	09-Jun-2021 14:47	09-Jun-2021 14:49	09-Jun-2021 14:51	----
Compound	CAS Number	LOR	Unit		EP2106517-001	EP2106517-005	EP2106517-006	EP2106517-007	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.03**	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW370_210609	0089_SW416_210609	0089_SW414_210609	0089_SW412_210609	----
				Sampling date / time	09-Jun-2021 09:42	09-Jun-2021 14:47	09-Jun-2021 14:49	09-Jun-2021 14:51	----
Compound	CAS Number	LOR	Unit		EP2106517-001	EP2106517-005	EP2106517-006	EP2106517-007	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.03**	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.03**	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.03**	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**93.5**	**92.7**	**89.5**	**84.8**	----
13C8-PFOA	----	0.02	%		**93.2**	**86.2**	**87.1**	**108**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0089_PW345_210609	0089_PW369_210609	0089_PW367_210609	----	----
			Sampling date / time	09-Jun-2021 09:58	09-Jun-2021 10:03	09-Jun-2021 10:21	----	----
Compound	CAS Number	LOR	Unit	EP2106517-002	EP2106517-003	EP2106517-004	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.74	7.82	7.71	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	39000	40200	33000	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	1720	112	2120	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	145	130	176	----	----
Total Alkalinity as CaCO3	----	1	mg/L	145	130	176	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2540	2600	2600	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18200	18600	18300	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	470	491	488	----	----
Magnesium	7439-95-4	1	mg/L	1480	1570	1530	----	----
Sodium	7440-23-5	1	mg/L	11400	12000	11700	----	----
Potassium	7440-09-7	1	mg/L	604	645	630	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	569	581	574	----	----
ø Total Cations	----	0.01	meq/L	656	692	675	----	----
ø Ionic Balance	----	0.01	%	7.13	8.70	8.12	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	68	9	54	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0089_PW345_210609	0089_PW369_210609	0089_PW367_210609	----	----
			Sampling date / time	09-Jun-2021 09:58	09-Jun-2021 10:03	09-Jun-2021 10:21	----	----
Compound	CAS Number	LOR	Unit	EP2106517-002	EP2106517-003	EP2106517-004	--------	--------
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.02**	**0.01**	**0.02**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0089_PW345_210609	0089_PW369_210609	0089_PW367_210609	----	----
			Sampling date / time	09-Jun-2021 09:58	09-Jun-2021 10:03	09-Jun-2021 10:21	----	----
Compound	CAS Number	LOR	Unit	EP2106517-002	EP2106517-003	EP2106517-004	--------	--------
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**0.02**	**0.01**	**0.02**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.02**	**0.01**	**0.02**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.02**	**0.01**	**0.02**	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**100**	**97.5**	**97.7**	----	----
13C8-PFOA	----	0.02	%	**89.9**	**81.9**	**88.5**	----	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106517**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23899	Issue Date	: 21-Jun-2021
Sampler	: [redacted]		
Site	: MB DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA005P: pH by PC Titrator (QC Lot: 3741443)									
EP2106517-002	0089_PW345_210609	EA005-P: pH Value	----	0.01	pH Unit	7.74	7.74	0.0	0% - 20%
EP2106519-004	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.00	8.00	0.0	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3738044)									
EP2106494-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	86400	85200	1.4	0% - 20%
EP2106514-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	472	469	0.6	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3738046)									
EP2106514-010	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	850	841	1.1	0% - 20%
EP2106519-005	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37600	37700	0.3	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3738053)									
EP2106517-007	0089_SW412_210609	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	41700	41700	0.0	0% - 20%
EP2106585-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	624	619	0.9	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3738045)									
EP2106514-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	37	43	14.4	No Limit
EP2106516-006	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	107	101	5.5	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3738047)									
EP2106514-010	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	375	418	10.7	0% - 20%
EP2106519-007	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	20	24	16.1	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3738054)									
EP2106517-007	0089_SW412_210609	EA025H: Suspended Solids (SS)	----	5	mg/L	6	6	0.0	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3741442)									
EP2106517-002	0089_PW345_210609	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	145	146	0.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3741442) - continued									
EP2106517-002	0089_PW345_210609	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	145	146	0.0	0% - 20%
EP2106519-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	114	113	1.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	114	113	1.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3729881)									
EP2106517-001	0089_SW370_210609	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2620	2610	0.4	0% - 20%
EP2106464-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	145	144	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3729882)									
EP2106517-001	0089_SW370_210609	ED045G: Chloride	16887-00-6	1	mg/L	18500	18300	1.0	0% - 20%
EP2106464-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	993	986	0.8	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3731487)									
EP2106514-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	125	122	2.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	160	157	2.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1690	1660	1.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	97	95	2.2	0% - 20%
EP2106516-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	121	125	3.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	46	48	4.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	128	133	3.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	19	20	0.0	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 3731488)									
EP2106517-006	0089_SW414_210609	ED093F: Calcium	7440-70-2	1	mg/L	503	483	4.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1620	1540	5.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12300	11800	4.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	665	627	5.8	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3734581)									
EP2106465-015	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.0	No Limit
EP2106517-001	0089_SW370_210609	EP005: Total Organic Carbon	----	1	mg/L	86	87	1.2	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3745065)									
EP2106519-008	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3745065)									
EP2106519-008	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3745065) - continued									
EP2106519-008	Anonymous	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3745065)									
EP2106519-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3745065)									
EP2106519-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3745065)									
EP2106519-008	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3741443)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3738044)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	106	88.1	114
				<10	1000 mg/L	102	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3738046)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	100	88.1	114
				<10	1000 mg/L	102	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3738053)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	104	88.1	114
				<10	1000 mg/L	101	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3738045)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	94.2	89.1	120
				<5	1000 mg/L	101	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3738047)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	99.5	89.1	120
				<5	1000 mg/L	101	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3738054)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	102	89.1	120
				<5	1000 mg/L	102	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3741442)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	108	81.2	126
				<1	200 mg/L	97.7	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729881)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.0	87.7	113
				<1	500 mg/L	101	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3729882)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.4	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3731487)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3731487) - continued								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.5	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3731488)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	107	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3734581)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	102	87.2	116
				<1	100 mg/L	109	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3742224)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	97.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	95.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	80.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	85.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	100	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	93.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3745065)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	95.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	86.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	93.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	97.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	101	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3742224)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	86.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	98.0	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	84.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	110	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	109	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	127	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	129	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	117	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	76.8	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	110	71.0	132

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3745065)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	97.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	97.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	116	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	112	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	127	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	98.4	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3742224)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	105	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	74.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	84.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	108	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	105	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	119	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	108	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3745065)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	115	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	113	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	107	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	118	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	124	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	124	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	101	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3742224)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	91.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	92.8	67.0	138

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3742224) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	76.4	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3745065)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	106	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	105	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	96.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	106	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3729881)							
EP2106445-009	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	97.6	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3729882)							
EP2106464-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	87.1	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3734581)							
EP2106465-016	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	110	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3745065)							
EP2106519-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	120	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	102	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	93.2	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	107	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	108	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	105	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3745065)							
EP2106519-009	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	114	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	102	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	110	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	114	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	128	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	120	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	121	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	111	72.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3745065) - continued							
EP2106519-009	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	89.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	98.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3745065)							
EP2106519-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	119	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	116	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	106	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	125	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	104	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	116	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	116	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3745065)							
EP2106519-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	104	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	107	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	101	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	92.2	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106517**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: MB DEF19009/Stirling SW/PW	Issue Date	: 21-Jun-2021
Sampler	: [redacted]	No. of samples received	: 7
Order number	: DEF19009/730	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_SW370_210609,	0089_PW345_210609,	----	----	----	17-Jun-2021	09-Jun-2021	**8**
0089_PW369_210609,	0089_PW367_210609,						
0089_SW416_210609,	0089_SW414_210609,						
0089_SW412_210609							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	35	2.86	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	35	2.86	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_SW370_210609,	0089_PW345_210609,	**09-Jun-2021**	**----**	----	----	**17-Jun-2021**	09-Jun-2021	×
0089_PW369_210609,	0089_PW367_210609,							
0089_SW416_210609,	0089_SW414_210609,							
0089_SW412_210609								
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_SW370_210609,	0089_PW345_210609,	**09-Jun-2021**	**----**	----	----	**16-Jun-2021**	16-Jun-2021	✓
0089_PW369_210609,	0089_PW367_210609,							
0089_SW416_210609,	0089_SW414_210609,							
0089_SW412_210609								

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW370_210609, 0089_PW345_210609, 0089_PW369_210609, 0089_PW367_210609, 0089_SW416_210609, 0089_SW414_210609, 0089_SW412_210609	**09-Jun-2021**	**----**	----	----	**16-Jun-2021**	16-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW370_210609, 0089_PW345_210609, 0089_PW369_210609, 0089_PW367_210609, 0089_SW416_210609, 0089_SW414_210609, 0089_SW412_210609	**09-Jun-2021**	**----**	----	----	**17-Jun-2021**	23-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW370_210609, 0089_PW345_210609, 0089_PW369_210609, 0089_PW367_210609, 0089_SW416_210609, 0089_SW414_210609, 0089_SW412_210609	**09-Jun-2021**	**----**	----	----	**18-Jun-2021**	07-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW370_210609, 0089_PW345_210609, 0089_PW369_210609, 0089_PW367_210609, 0089_SW416_210609, 0089_SW414_210609, 0089_SW412_210609	**09-Jun-2021**	**----**	----	----	**18-Jun-2021**	07-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW370_210609, 0089_PW345_210609, 0089_PW369_210609, 0089_PW367_210609, 0089_SW416_210609, 0089_SW414_210609, 0089_SW412_210609	**09-Jun-2021**	**----**	----	----	**15-Jun-2021**	16-Jun-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW370_210609, 0089_PW345_210609, 0089_PW369_210609, 0089_PW367_210609, 0089_SW416_210609, 0089_SW414_210609, 0089_SW412_210609	**09-Jun-2021**	**----**	----	----	**14-Jun-2021**	07-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW370_210609, 0089_PW345_210609, 0089_PW369_210609, 0089_PW367_210609, 0089_SW416_210609, 0089_SW414_210609, 0089_SW412_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW370_210609, 0089_PW345_210609, 0089_PW369_210609, 0089_PW367_210609, 0089_SW416_210609, 0089_SW414_210609, 0089_SW412_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW370_210609, 0089_PW345_210609, 0089_PW369_210609, 0089_PW367_210609, 0089_SW416_210609, 0089_SW414_210609, 0089_SW412_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW370_210609, 0089_PW345_210609, 0089_PW369_210609, 0089_PW367_210609, 0089_SW416_210609, 0089_SW414_210609, 0089_SW412_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW370_210609, 0089_PW345_210609, 0089_PW369_210609, 0089_PW367_210609, 0089_SW416_210609, 0089_SW414_210609, 0089_SW412_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	29	**10.34**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	35	**2.86**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	5	39	**12.82**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	56	**10.71**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	6	39	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	56	**10.71**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	39	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	56	**5.36**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	35	**2.86**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106517**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23899	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: MB DEF19009/Stirling SW/PW		
Sampler	: [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 17:10	Issue Date	: 10-Jun-2021
Client Requested Due Date	: 21-Jun-2021	Scheduled Reporting Date	: **21-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 5	Temperature	: 15.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106517-001	09-Jun-2021 09:42	0089_SW370_210609	✓	✓	✓	✓	✓	✓	✓
EP2106517-002	09-Jun-2021 09:58	0089_PW345_210609	✓	✓	✓	✓	✓	✓	✓
EP2106517-003	09-Jun-2021 10:03	0089_PW369_210609	✓	✓	✓	✓	✓	✓	✓
EP2106517-004	09-Jun-2021 10:21	0089_PW367_210609	✓	✓	✓	✓	✓	✓	✓
EP2106517-005	09-Jun-2021 14:47	0089_SW416_210609	✓	✓	✓	✓	✓	✓	✓
EP2106517-006	09-Jun-2021 14:49	0089_SW414_210609	✓	✓	✓	✓	✓	✓	✓
EP2106517-007	09-Jun-2021 14:51	0089_SW412_210609	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106517-001	09-Jun-2021 09:42	0089_SW370_210609	✓
EP2106517-002	09-Jun-2021 09:58	0089_PW345_210609	✓
EP2106517-003	09-Jun-2021 10:03	0089_PW369_210609	✓
EP2106517-004	09-Jun-2021 10:21	0089_PW367_210609	✓
EP2106517-005	09-Jun-2021 14:47	0089_SW416_210609	✓
EP2106517-006	09-Jun-2021 14:49	0089_SW414_210609	✓
EP2106517-007	09-Jun-2021 14:51	0089_SW412_210609	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]cardno.com.au

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2106517

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_C0089_PFASOTP **Client:** CARDNO

Project Manager: [redacted]

23886 23915 23896 23898 23900

ALS Compass COC Reference: 23914 **# Samples:** 23899

Phone: ( )

Sampler: [redacted]

Phone: ( )

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send QC211 & QC212 to Eurofins

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
CARDNO	[redacted]		
Date / Time: 9/6/21	Date / Time: 1710 9/6/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 23899 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW370		09/06/2021 09:42 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
002	0089_PW345		09/06/2021 09:58 AM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
003	0089_PW369		09/06/2021 10:03 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
004	0089_PW367		09/06/2021 10:21 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
005	0089_SW416		09/06/2021 02:47 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
006	0089_SW414		09/06/2021 02:49 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
007	0089_SW412		09/06/2021 02:51 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

(ALS) COC#: **23899** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW370	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW345	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW369	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_PW367	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_SW416	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **23899** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_SW414	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_SW412	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23899 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW370	HDPE (no PTFE)	20 mL	00350019151066	Grey	No	
001	0089_SW370	Clear Plastic Bottle - Natural	250 mL	00070220025173	Green	No	
001	0089_SW370	Clear Plastic Bottle - Natural	250 mL	00070220025274	Green	No	
001	0089_SW370	HDPE (no PTFE)	20 mL	00350019151089	Grey	No	
001	0089_SW370	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014348	Purple	No	
002	0089_PW345	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019525	Purple	No	
002	0089_PW345	HDPE (no PTFE)	20 mL	00350019130746	Grey	No	
002	0089_PW345	HDPE (no PTFE)	20 mL	00350019151586	Grey	No	
002	0089_PW345	Clear Plastic Bottle - Natural	250 mL	00071018014791	Green	No	
003	0089_PW369	Clear Plastic Bottle - Natural	250 mL	00070220025180	Green	No	
003	0089_PW369	HDPE (no PTFE)	20 mL	00350019150904	Grey	No	
003	0089_PW369	HDPE (no PTFE)	20 mL	00350019151288	Grey	No	
003	0089_PW369	Clear Plastic Bottle - Natural	250 mL	00070220025260	Green	No	
003	0089_PW369	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016824	Purple	No	
004	0089_PW367	HDPE (no PTFE)	20 mL	00350019151113	Grey	No	
004	0089_PW367	Clear Plastic Bottle - Natural	250 mL	00070220025286	Green	No	
004	0089_PW367	Clear Plastic Bottle - Natural	250 mL	00070220025222	Green	No	
004	0089_PW367	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014405	Purple	No	
004	0089_PW367	HDPE (no PTFE)	20 mL	00350019151355	Grey	No	
005	0089_SW416	Clear Plastic Bottle - Natural	250 mL	00070220025267	Green	No	
005	0089_SW416	Clear Plastic Bottle - Natural	250 mL	00070220025251	Green	No	
005	0089_SW416	HDPE (no PTFE)	20 mL	00350019151347	Grey	No	
005	0089_SW416	HDPE (no PTFE)	20 mL	00350019151005	Grey	No	
005	0089_SW416	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014336	Purple	No	
006	0089_SW414	HDPE (no PTFE)	20 mL	00350019151075	Grey	No	
006	0089_SW414	Clear Plastic Bottle - Natural	250 mL	00070220025296	Green	No	

CHAIN OF CUSTODY

COC#: **23899** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_SW414	HDPE (no PTFE)	20 mL	00350019150825	Grey	No	
006	0089_SW414	Clear Plastic Bottle - Natural	250 mL	00070220025302	Green	No	
006	0089_SW414	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014315	Purple	No	
007	0089_SW412	Clear Plastic Bottle - Natural	250 mL	00070220025283	Green	No	
007	0089_SW412	HDPE (no PTFE)	20 mL	00350019151222	Grey	No	
007	0089_SW412	Clear Plastic Bottle - Natural	250 mL	00070220025201	Green	No	
007	0089_SW412	HDPE (no PTFE)	20 mL	00350019150982	Grey	No	
007	0089_SW412	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016825	Purple	No	

Total Bottle Count: ALS: 34, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106518**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 17:10
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23900	Issue Date	: 18-Jun-2021 16:20
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD345_210609	0089_SD369_210609	0089_SD367_210609	----	----
			Sampling date / time	09-Jun-2021 10:04	09-Jun-2021 10:06	09-Jun-2021 10:20	----	----
Compound	CAS Number	LOR	Unit	EP2106518-001	EP2106518-002	EP2106518-003	--------	--------
				Result	Result	Result	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.6**	**9.6**	**9.5**	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**186**	**50**	**58**	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**10.3**	**9.8**	**10.6**	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**3.8**	**4.9**	**9.0**	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.6**	**0.5**	**0.7**	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.6**	<0.1	<0.1	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**5.1**	**5.5**	**9.8**	----	----
Exchangeable Sodium Percent	----	0.1	%	**12.8**	**1.0**	**0.6**	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	**1.1**	**0.9**	**0.9**	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0003**	**0.0003**	**0.0004**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD345_210609	0089_SD369_210609	0089_SD367_210609	----	----
				Sampling date / time	09-Jun-2021 10:04	09-Jun-2021 10:06	09-Jun-2021 10:20	----	----
Compound	CAS Number	LOR	Unit		EP2106518-001	EP2106518-002	EP2106518-003	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0003**	**0.0003**	**0.0004**	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)			Sample ID	0089_SD345_210609	0089_SD369_210609	0089_SD367_210609	----	----
			Sampling date / time	09-Jun-2021 10:04	09-Jun-2021 10:06	09-Jun-2021 10:20	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EP2106518-001**	**EP2106518-002**	**EP2106518-003**	--------	--------
				Result	Result	Result	----	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0003**	**0.0003**	**0.0004**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0003**	**0.0003**	**0.0004**	**----**	**----**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**107**	**108**	**110**	**----**	**----**
13C8-PFOA	----	0.0002	%	**98.5**	**100**	**98.5**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106518**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23900	Issue Date	: 18-Jun-2021
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3734068)									
EP2106518-001	0089_SD345_210609	EA002: pH Value	----	0.1	pH Unit	9.6	9.7	0.0	0% - 20%
EP2106520-007	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.3	9.3	0.0	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3734069)									
EP2106518-001	0089_SD345_210609	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	186	194	3.9	0% - 20%
EP2106520-007	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	25900	25600	1.2	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3733955)									
EP2106518-001	0089_SD345_210609	EA055: Moisture Content	----	0.1	%	10.3	10.4	0.0	0% - 20%
ED007: Exchangeable Cations (QC Lot: 3738281)									
EP2106518-001	0089_SD345_210609	ED007: Exchangeable Sodium Percent	----	0.1	%	12.8	15.0	16.0	0% - 20%
		ED007: Exchangeable Calcium	----	0.1	meq/100g	3.8	3.7	0.0	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	0.6	0.7	0.0	No Limit
		ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.6	0.8	17.8	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	5.1	5.2	0.0	0% - 20%
EP004: Organic Matter (QC Lot: 3733939)									
EP2106518-001	0089_SD345_210609	EP004: Organic Matter	----	0.5	%	1.1	1.1	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3740904)									
EP2106466-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2106518-003	0089_SD367_210609	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3740904) - continued									
EP2106518-003	0089_SD367_210609	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0004	0.0004	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3740904)									
EP2106466-009	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2106518-003	0089_SD367_210609	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740904)									
EP2106466-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740904) - continued									
EP2106466-009	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106518-003	0089_SD367_210609	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3740904)									
EP2106466-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106518-003	0089_SD367_210609	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3734068)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3734069)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	147 µS/cm	101	93.6	106
ED007: Exchangeable Cations (QCLot: 3738281)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	21.6 meq/100g	93.9	82.9	117
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.76 meq/100g	96.6	78.4	119
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	1 meq/100g	108	87.9	129
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.9 meq/100g	106	92.9	132
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	25.3 meq/100g	94.9	84.7	117
ED007: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
EP004: Organic Matter (QCLot: 3733939)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	86.1	70.0	120
				<0.5	85 %	90.8	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740904)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.8	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740904)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	94.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	110	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740904)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740904) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	112	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.1	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.6	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740904)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	100	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	111	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	107	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740904)							
EP2106466-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	88.0	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	92.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	92.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	90.4	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	86.8	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	96.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740904)							
EP2106466-009	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	93.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	97.2	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	95.2	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	96.8	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	96.4	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	89.2	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	92.4	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740904) - continued							
EP2106466-009	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	95.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	106	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	96.0	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	111	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740904)							
EP2106466-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	122	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	110	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	105	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	97.6	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	99.8	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	82.0	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	97.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740904)							
EP2106466-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	94.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	99.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	118	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	120	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106518**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: DEF19009/Stirling	Issue Date	: 18-Jun-2021
Sampler	: [redacted]	No. of samples received	: 3
Order number	: DEF19009/730	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD345_210609, 0089_SD369_210609, 0089_SD367_210609	**09-Jun-2021**	**15-Jun-2021**	16-Jun-2021	✓	**15-Jun-2021**	15-Jun-2021	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD345_210609, 0089_SD369_210609, 0089_SD367_210609	**09-Jun-2021**	**15-Jun-2021**	16-Jun-2021	✓	**15-Jun-2021**	13-Jul-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD345_210609, 0089_SD369_210609, 0089_SD367_210609	**09-Jun-2021**	**----**	----	----	**14-Jun-2021**	23-Jun-2021	✓
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED007)							
0089_SD345_210609, 0089_SD369_210609, 0089_SD367_210609	**09-Jun-2021**	**16-Jun-2021**	07-Jul-2021	✓	**16-Jun-2021**	07-Jul-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD345_210609, 0089_SD369_210609, 0089_SD367_210609	**09-Jun-2021**	**15-Jun-2021**	07-Jul-2021	✓	**15-Jun-2021**	07-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD345_210609, 0089_SD369_210609, 0089_SD367_210609	**09-Jun-2021**	**17-Jun-2021**	06-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD345_210609, 0089_SD369_210609, 0089_SD367_210609	**09-Jun-2021**	**17-Jun-2021**	06-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD345_210609, 0089_SD369_210609, 0089_SD367_210609	**09-Jun-2021**	**17-Jun-2021**	06-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD345_210609, 0089_SD369_210609, 0089_SD367_210609	**09-Jun-2021**	**17-Jun-2021**	06-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD345_210609, 0089_SD369_210609, 0089_SD367_210609	**09-Jun-2021**	**17-Jun-2021**	06-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	3	**66.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106518**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23900	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 17:10	Issue Date	: 10-Jun-2021
Client Requested Due Date	: 21-Jun-2021	Scheduled Reporting Date	: **21-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 5	Temperature	: 15.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2106518-001	09-Jun-2021 10:04	0089_SD345_210609	✓	✓	✓	✓
EP2106518-002	09-Jun-2021 10:06	0089_SD369_210609	✓	✓	✓	✓
EP2106518-003	09-Jun-2021 10:20	0089_SD367_210609	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2106518

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_C0089_PFASOTP **Client:** CARDNO

Project Manager: [redacted]

Phone:)

23886 23915 23896 23898 23900

ALS Compass COC Reference: 23914 **# Samples:** 23899

Sampler:

Phone:)

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send QC211 & QC212 to Eurofins

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
CARDNO	[redacted]		
Date / Time: 9/6/21	Date / Time: 1710 9/6/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: **23900** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD345		09/06/2021 10:04 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD369		09/06/2021 10:06 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD367		09/06/2021 10:20 AM	Soil	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

COC#: **23900** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MB DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD345	HDPE Soil Jar	200 mL	00620719057123	Grey	No	
001	0089_SD345	Soil Glass Jar - Unpreserved	150 mL	00260121045214	Orange	No	
002	0089_SD369	HDPE Soil Jar	200 mL	00620719062499	Grey	No	
002	0089_SD369	Soil Glass Jar - Unpreserved	150 mL	00260121045304	Orange	No	
003	0089_SD367	Soil Glass Jar - Unpreserved	150 mL	00260121045264	Orange	No	
003	0089_SD367	HDPE Soil Jar	200 mL	00620719063292	Grey	No	

Total Bottle Count: ALS: 6, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106519**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 17:10
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23914	Issue Date	: 21-Jun-2021 20:53
Sampler	: [redacted], [redacted]		
Site	: ah DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW316_210609	0089_PW307_210609	0089_PW315_210609	0089_PW314_210609	0089_PW306_210609
			Sampling date / time	09-Jun-2021 13:19	09-Jun-2021 13:25	09-Jun-2021 13:34	09-Jun-2021 13:44	09-Jun-2021 13:57
Compound	CAS Number	LOR	Unit	EP2106519-003	EP2106519-004	EP2106519-006	EP2106519-007	EP2106519-008
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.00	8.00	7.96	7.92	7.93
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	38500	38200	38100	36000	39500
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	376	83	210	20	44
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	118	114	114	109	115
Total Alkalinity as CaCO3	----	1	mg/L	118	114	114	109	115
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2580	2580	2560	2580	2550
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18400	18500	18500	18700	18700
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	474	482	463	463	472
Magnesium	7439-95-4	1	mg/L	1510	1540	1480	1480	1510
Sodium	7440-23-5	1	mg/L	11700	12000	11300	11400	11700
Potassium	7440-09-7	1	mg/L	631	651	616	619	634
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	575	578	577	583	583
ø Total Cations	----	0.01	meq/L	673	689	652	657	673
ø Ionic Balance	----	0.01	%	7.84	8.80	6.08	5.90	7.17
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	<1	2	4	1	2
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW316_210609	0089_PW307_210609	0089_PW315_210609	0089_PW314_210609	0089_PW306_210609
				Sampling date / time	09-Jun-2021 13:19	09-Jun-2021 13:25	09-Jun-2021 13:34	09-Jun-2021 13:44	09-Jun-2021 13:57
Compound	CAS Number	LOR	Unit		EP2106519-003	EP2106519-004	EP2106519-006	EP2106519-007	EP2106519-008
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW316_210609	0089_PW307_210609	0089_PW315_210609	0089_PW314_210609	0089_PW306_210609
				Sampling date / time	09-Jun-2021 13:19	09-Jun-2021 13:25	09-Jun-2021 13:34	09-Jun-2021 13:44	09-Jun-2021 13:57
					EP2106519-003	EP2106519-004	EP2106519-006	EP2106519-007	EP2106519-008
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**80.7**	**91.5**	**90.5**	**91.0**	**84.8**
13C8-PFOA	----	0.02	%		**102**	**110**	**104**	**110**	**106**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW415_210609	0089_PW413_210609	0089_PW411_210609	----	----
			Sampling date / time	09-Jun-2021 14:30	09-Jun-2021 14:36	09-Jun-2021 14:41	----	----
Compound	CAS Number	LOR	Unit	EP2106519-010	EP2106519-011	EP2106519-012	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.88	7.86	7.87	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	37400	38900	33300	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	172	162	66	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	125	118	115	----	----
Total Alkalinity as CaCO3	----	1	mg/L	125	118	115	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2630	2590	2630	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18500	18800	18800	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	499	477	479	----	----
Magnesium	7439-95-4	1	mg/L	1580	1510	1520	----	----
Sodium	7440-23-5	1	mg/L	12200	11700	11700	----	----
Potassium	7440-09-7	1	mg/L	666	634	633	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	579	587	587	----	----
ø Total Cations	----	0.01	meq/L	703	673	674	----	----
ø Ionic Balance	----	0.01	%	9.64	6.87	6.88	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	2	2	3	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW415_210609	0089_PW413_210609	0089_PW411_210609	----	----
				Sampling date / time	09-Jun-2021 14:30	09-Jun-2021 14:36	09-Jun-2021 14:41	----	----
Compound	CAS Number	LOR	Unit		EP2106519-010	EP2106519-011	EP2106519-012	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW415_210609	0089_PW413_210609	0089_PW411_210609	----	----
				Sampling date / time	09-Jun-2021 14:30	09-Jun-2021 14:36	09-Jun-2021 14:41	----	----
Compound	CAS Number	LOR	Unit		EP2106519-010	EP2106519-011	EP2106519-012	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**86.7**	**95.8**	**89.0**	----	----
13C8-PFOA	----	0.02	%		**103**	**104**	**105**	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_PW308_210609	0089_SW311_210609	0089_SW310_210609	0089_SW309_210609	----
			Sampling date / time	09-Jun-2021 13:05	09-Jun-2021 13:15	09-Jun-2021 13:31	09-Jun-2021 14:00	----
Compound	CAS Number	LOR	Unit	EP2106519-001	EP2106519-002	EP2106519-005	EP2106519-009	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.01	8.12	8.08	8.09	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	38500	35400	37600	39000	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	54	20	19	26	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	111	113	115	114	----
Total Alkalinity as CaCO3	----	1	mg/L	111	113	115	114	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2620	2590	2570	2630	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18400	18300	18500	18900	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	468	474	466	470	----
Magnesium	7439-95-4	1	mg/L	1490	1500	1480	1500	----
Sodium	7440-23-5	1	mg/L	11500	11600	11400	11600	----
Potassium	7440-09-7	1	mg/L	625	632	618	630	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	576	572	578	590	----
ø Total Cations	----	0.01	meq/L	662	668	657	668	----
ø Ionic Balance	----	0.01	%	6.98	7.70	6.40	6.15	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	3	<1	2	1	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW308_210609	0089_SW311_210609	0089_SW310_210609	0089_SW309_210609	----
				Sampling date / time	09-Jun-2021 13:05	09-Jun-2021 13:15	09-Jun-2021 13:31	09-Jun-2021 14:00	----
Compound	CAS Number	LOR	Unit		EP2106519-001	EP2106519-002	EP2106519-005	EP2106519-009	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW308_210609	0089_SW311_210609	0089_SW310_210609	0089_SW309_210609	----
				Sampling date / time	09-Jun-2021 13:05	09-Jun-2021 13:15	09-Jun-2021 13:31	09-Jun-2021 14:00	----
Compound	CAS Number	LOR	Unit		EP2106519-001	EP2106519-002	EP2106519-005	EP2106519-009	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**82.1**	**86.9**	**97.1**	**92.9**	----
13C8-PFOA	----	0.02	%		**106**	**103**	**101**	**104**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106519**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23914	Issue Date	: 21-Jun-2021
Sampler	: [redacted], [redacted]		
Site	: ah DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3741443)									
EP2106517-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.74	7.74	0.0	0% - 20%
EP2106519-004	0089_PW307_210609	EA005-P: pH Value	----	0.01	pH Unit	8.00	8.00	0.0	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3738046)									
EP2106514-010	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	850	841	1.1	0% - 20%
EP2106519-005	0089_SW310_210609	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37600	37700	0.3	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3738047)									
EP2106514-010	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	375	418	10.7	0% - 20%
EP2106519-007	0089_PW314_210609	EA025H: Suspended Solids (SS)	----	5	mg/L	20	24	16.1	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3741442)									
EP2106517-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	145	146	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	145	146	0.0	0% - 20%
EP2106519-004	0089_PW307_210609	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	114	113	1.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	114	113	1.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734677)									
EP2106519-001	0089_PW308_210609	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2620	2620	0.1	0% - 20%
EP2106519-011	0089_PW413_210609	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2590	2610	1.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3734678)									
EP2106519-001	0089_PW308_210609	ED045G: Chloride	16887-00-6	1	mg/L	18400	18400	0.0	0% - 20%
EP2106519-011	0089_PW413_210609	ED045G: Chloride	16887-00-6	1	mg/L	18800	18700	0.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3731492)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3731492) - continued									
EP2106519-001	0089_PW308_210609	ED093F: Calcium	7440-70-2	1	mg/L	468	476	1.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1490	1520	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11500	11700	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	625	634	1.4	0% - 20%
EP2106519-011	0089_PW413_210609	ED093F: Calcium	7440-70-2	1	mg/L	477	478	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1510	1520	0.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11700	11700	0.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	634	642	1.2	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3734581)									
EP2106465-015	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.0	No Limit
EP2106517-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	86	87	1.2	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3736802)									
EP2106514-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.0	No Limit
EP2106515-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3745065)									
EP2106519-008	0089_PW306_210609	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3745065)									
EP2106519-008	0089_PW306_210609	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3745065)									
EP2106519-008	0089_PW306_210609	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3745065) - continued									
EP2106519-008	0089_PW306_210609	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3745065)									
EP2106519-008	0089_PW306_210609	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3745065)									
EP2106519-008	0089_PW306_210609	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3741443)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3738046)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	100	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3738047)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	99.5	89.1	120
				<5	1000 mg/L	101	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3741442)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	108	81.2	126
				<1	200 mg/L	97.7	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734677)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100.0	87.7	113
				<1	500 mg/L	101	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3734678)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	111	87.9	114
				<1	1000 mg/L	99.4	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3731492)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.7	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3734581)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	102	87.2	116
				<1	100 mg/L	109	87.2	116
EP005: Total Organic Carbon (TOC) (QCLot: 3736802)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	99.1	87.2	116
				<1	100 mg/L	103	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3745065)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3745065) - continued								
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	95.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	86.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	93.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	97.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	101	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3745065)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	97.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	97.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	116	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	112	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	127	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	98.4	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3745065)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	115	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	113	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	107	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	118	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	124	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	124	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	101	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3745065)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	106	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	105	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	96.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	106	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734677)							
EP2106519-001	0089_PW308_210609	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3734678)							
EP2106519-001	0089_PW308_210609	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3734581)							
EP2106465-016	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	110	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3736802)							
EP2106514-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	107	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3745065)							
EP2106519-009	0089_SW309_210609	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	120	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	102	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	93.2	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	107	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	108	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	105	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3745065)							
EP2106519-009	0089_SW309_210609	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	114	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	102	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	110	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	114	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	128	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	120	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	121	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	111	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	89.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	98.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3745065)							
EP2106519-009	0089_SW309_210609	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	119	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	116	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	106	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	125	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	104	57.6	145

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3745065) - continued							
EP2106519-009	0089_SW309_210609	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	116	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	116	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3745065)							
EP2106519-009	0089_SW309_210609	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	104	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	107	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	101	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	92.2	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106519**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: ah DEF19009/Stirling SW/PW	Issue Date	: 21-Jun-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 12
Order number	: DEF19009/730	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2106519--001	0089_PW308_210609	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2106519--001	0089_PW308_210609	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_PW308_210609,	0089_SW311_210609,	----	----	----	17-Jun-2021	09-Jun-2021	**8**
0089_PW316_210609,	0089_PW307_210609,						
0089_SW310_210609,	0089_PW315_210609,						
0089_PW314_210609,	0089_PW306_210609,						
0089_SW309_210609,	0089_PW415_210609,						
0089_PW413_210609,	0089_PW411_210609						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_PW308_210609,	0089_SW311_210609,	**09-Jun-2021**	**----**	----	----	**17-Jun-2021**	09-Jun-2021	×
0089_PW316_210609,	0089_PW307_210609,							
0089_SW310_210609,	0089_PW315_210609,							
0089_PW314_210609,	0089_PW306_210609,							
0089_SW309_210609,	0089_PW415_210609,							
0089_PW413_210609,	0089_PW411_210609							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_PW308_210609,	0089_SW311_210609,	**09-Jun-2021**	**----**	----	----	**16-Jun-2021**	16-Jun-2021	✓
0089_PW316_210609,	0089_PW307_210609,							
0089_SW310_210609,	0089_PW315_210609,							
0089_PW314_210609,	0089_PW306_210609,							
0089_SW309_210609,	0089_PW415_210609,							
0089_PW413_210609,	0089_PW411_210609							
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
0089_PW308_210609,	0089_SW311_210609,	**09-Jun-2021**	**----**	----	----	**16-Jun-2021**	16-Jun-2021	✓
0089_PW316_210609,	0089_PW307_210609,							
0089_SW310_210609,	0089_PW315_210609,							
0089_PW314_210609,	0089_PW306_210609,							
0089_SW309_210609,	0089_PW415_210609,							
0089_PW413_210609,	0089_PW411_210609							
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_PW308_210609,	0089_SW311_210609,	**09-Jun-2021**	**----**	----	----	**17-Jun-2021**	23-Jun-2021	✓
0089_PW316_210609,	0089_PW307_210609,							
0089_SW310_210609,	0089_PW315_210609,							
0089_PW314_210609,	0089_PW306_210609,							
0089_SW309_210609,	0089_PW415_210609,							
0089_PW413_210609,	0089_PW411_210609							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_PW308_210609,	0089_SW311_210609,	**09-Jun-2021**	**----**	----	----	**18-Jun-2021**	07-Jul-2021	✓
0089_PW316_210609,	0089_PW307_210609,							
0089_SW310_210609,	0089_PW315_210609,							
0089_PW314_210609,	0089_PW306_210609,							
0089_SW309_210609,	0089_PW415_210609,							
0089_PW413_210609,	0089_PW411_210609							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW308_210609, 0089_SW311_210609, 0089_PW316_210609, 0089_PW307_210609, 0089_SW310_210609, 0089_PW315_210609, 0089_PW314_210609, 0089_PW306_210609, 0089_SW309_210609, 0089_PW415_210609, 0089_PW413_210609, 0089_PW411_210609	**09-Jun-2021**	**----**	----	----	**18-Jun-2021**	07-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_PW308_210609, 0089_SW311_210609, 0089_PW316_210609, 0089_PW307_210609, 0089_SW310_210609, 0089_PW315_210609, 0089_PW314_210609, 0089_PW306_210609, 0089_SW309_210609, 0089_PW415_210609, 0089_PW413_210609, 0089_PW411_210609	**09-Jun-2021**	**----**	----	----	**16-Jun-2021**	16-Jun-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW308_210609, 0089_SW311_210609, 0089_PW316_210609	**09-Jun-2021**	**----**	----	----	**14-Jun-2021**	07-Jul-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW307_210609, 0089_SW310_210609, 0089_PW315_210609, 0089_PW314_210609, 0089_PW306_210609, 0089_SW309_210609, 0089_PW415_210609, 0089_PW413_210609, 0089_PW411_210609	**09-Jun-2021**	**----**	----	----	**15-Jun-2021**	07-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW308_210609, 0089_SW311_210609, 0089_PW316_210609, 0089_PW307_210609, 0089_SW310_210609, 0089_PW315_210609, 0089_PW314_210609, 0089_PW306_210609, 0089_SW309_210609, 0089_PW415_210609, 0089_PW413_210609, 0089_PW411_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW308_210609, 0089_SW311_210609, 0089_PW316_210609, 0089_PW307_210609, 0089_SW310_210609, 0089_PW315_210609, 0089_PW314_210609, 0089_PW306_210609, 0089_SW309_210609, 0089_PW415_210609, 0089_PW413_210609, 0089_PW411_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW308_210609, 0089_SW311_210609, 0089_PW316_210609, 0089_PW307_210609, 0089_SW310_210609, 0089_PW315_210609, 0089_PW314_210609, 0089_PW306_210609, 0089_SW309_210609, 0089_PW415_210609, 0089_PW413_210609, 0089_PW411_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW308_210609, 0089_SW311_210609, 0089_PW316_210609, 0089_PW307_210609, 0089_SW310_210609, 0089_PW315_210609, 0089_PW314_210609, 0089_PW306_210609, 0089_SW309_210609, 0089_PW415_210609, 0089_PW413_210609, 0089_PW411_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW308_210609, 0089_SW311_210609, 0089_PW316_210609, 0089_PW307_210609, 0089_SW310_210609, 0089_PW315_210609, 0089_PW314_210609, 0089_PW306_210609, 0089_SW309_210609, 0089_PW415_210609, 0089_PW413_210609, 0089_PW411_210609	**09-Jun-2021**	**19-Jun-2021**	06-Dec-2021	✓	**19-Jun-2021**	06-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106519**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23914	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ah DEF19009/Stirling SW/PW		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 17:10	Issue Date	: 10-Jun-2021
Client Requested Due Date	: 21-Jun-2021	Scheduled Reporting Date	: **21-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 5	Temperature	: 15.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106519-001	09-Jun-2021 13:05	0089_PW308_210609	✓	✓	✓	✓	✓	✓	✓
EP2106519-002	09-Jun-2021 13:15	0089_SW311_210609	✓	✓	✓	✓	✓	✓	✓
EP2106519-003	09-Jun-2021 13:19	0089_PW316_210609	✓	✓	✓	✓	✓	✓	✓
EP2106519-004	09-Jun-2021 13:25	0089_PW307_210609	✓	✓	✓	✓	✓	✓	✓
EP2106519-005	09-Jun-2021 13:31	0089_SW310_210609	✓	✓	✓	✓	✓	✓	✓
EP2106519-006	09-Jun-2021 13:34	0089_PW315_210609	✓	✓	✓	✓	✓	✓	✓
EP2106519-007	09-Jun-2021 13:44	0089_PW314_210609	✓	✓	✓	✓	✓	✓	✓
EP2106519-008	09-Jun-2021 13:57	0089_PW306_210609	✓	✓	✓	✓	✓	✓	✓
EP2106519-009	09-Jun-2021 14:00	0089_SW309_210609	✓	✓	✓	✓	✓	✓	✓
EP2106519-010	09-Jun-2021 14:30	0089_PW415_210609	✓	✓	✓	✓	✓	✓	✓
EP2106519-011	09-Jun-2021 14:36	0089_PW413_210609	✓	✓	✓	✓	✓	✓	✓
EP2106519-012	09-Jun-2021 14:41	0089_PW411_210609	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106519-001	09-Jun-2021 13:05	0089_PW308_210609	✓
EP2106519-002	09-Jun-2021 13:15	0089_SW311_210609	✓
EP2106519-003	09-Jun-2021 13:19	0089_PW316_210609	✓
EP2106519-004	09-Jun-2021 13:25	0089_PW307_210609	✓
EP2106519-005	09-Jun-2021 13:31	0089_SW310_210609	✓
EP2106519-006	09-Jun-2021 13:34	0089_PW315_210609	✓
EP2106519-007	09-Jun-2021 13:44	0089_PW314_210609	✓
EP2106519-008	09-Jun-2021 13:57	0089_PW306_210609	✓
EP2106519-009	09-Jun-2021 14:00	0089_SW309_210609	✓
EP2106519-010	09-Jun-2021 14:30	0089_PW415_210609	✓
EP2106519-011	09-Jun-2021 14:36	0089_PW413_210609	✓
EP2106519-012	09-Jun-2021 14:41	0089_PW411_210609	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]cardno.com.au

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2106519

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_C089_PFASOTP **Client:** CARDNO

Project Manage [redacted]

Phone:)

~~23886~~ 23915 23896 23898 23900

ALS Compass COC Reference: 23914 **# Samples:** 23899

Sampler:

Phone:)

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send QC211 & QC212 to Eurofins

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
CARDNO	[redacted]		
Date / Time: 9/6/21	Date / Time: 1710 9/6/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 23914 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO:

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW308		09/06/2021 01:05 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
002	0089_SW311		09/06/2021 01:15 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
003	0089_PW316		09/06/2021 01:19 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
004	0089_PW307		09/06/2021 01:25 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
005	0089_SW310		09/06/2021 01:31 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
006	0089_PW315		09/06/2021 01:34 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
007	0089_PW314		09/06/2021 01:44 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
008	0089_PW306	extra for qc	09/06/2021 01:57 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8	X		
009	0089_SW309	extra for qc	09/06/2021 02:00 PM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

(ALS) COC#: 23914 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_PW415		09/06/2021 02:30 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
011	0089_PW413		09/06/2021 02:36 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		
012	0089_PW411		09/06/2021 02:41 PM	Water	ALS: 4 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

(ALS) COC#: **23914** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO:

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW308	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_SW311	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW316	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_PW307	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_SW310	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23914 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW315	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW314	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_PW306	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_SW309	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_PW415	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_PW413	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23914 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

012	0089_PW411	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **23914** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW308	HDPE (no PTFE)	20 mL	00350019150916	Grey	No	
001	0089_PW308	HDPE (no PTFE)	20 mL	00350019151024	Grey	No	
001	0089_PW308	Clear Plastic Bottle - Natural	250 mL	00070220025597	Green	No	
001	0089_PW308	Clear Plastic Bottle - Natural	250 mL	00070220025299	Green	No	
001	0089_PW308	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016807	Purple	No	
002	0089_SW311	HDPE (no PTFE)	20 mL	00350019151119	Grey	No	
002	0089_SW311	Clear Plastic Bottle - Natural	250 mL	00070220025209	Green	No	
002	0089_SW311	HDPE (no PTFE)	20 mL	00350019150910	Grey	No	
002	0089_SW311	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016775	Purple	No	
002	0089_SW311	Clear Plastic Bottle - Natural	250 mL	00070220025248	Green	No	
003	0089_PW316	Clear Plastic Bottle - Natural	250 mL	00070220025171	Green	No	
003	0089_PW316	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014320	Purple	No	
003	0089_PW316	Clear Plastic Bottle - Natural	250 mL	00070220025364	Green	No	
003	0089_PW316	HDPE (no PTFE)	20 mL	00350019151203	Grey	No	
003	0089_PW316	HDPE (no PTFE)	20 mL	00350019150769	Grey	No	
004	0089_PW307	HDPE (no PTFE)	20 mL	00350019150856	Grey	No	
004	0089_PW307	HDPE (no PTFE)	20 mL	00350019151221	Grey	No	
004	0089_PW307	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016855	Purple	No	
004	0089_PW307	Clear Plastic Bottle - Natural	250 mL	00070220025241	Green	No	
004	0089_PW307	Clear Plastic Bottle - Natural	250 mL	00070220025255	Green	No	
005	0089_SW310	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016614	Purple	No	
005	0089_SW310	HDPE (no PTFE)	20 mL	00350019151176	Grey	No	
005	0089_SW310	HDPE (no PTFE)	20 mL	00350019151011	Grey	No	
005	0089_SW310	Clear Plastic Bottle - Natural	250 mL	00070220025306	Green	No	
005	0089_SW310	Clear Plastic Bottle - Natural	250 mL	00070220025381	Green	No	
006	0089_PW315	HDPE (no PTFE)	20 mL	00350019151127	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 23914 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_PW315	HDPE (no PTFE)	20 mL	00350019150989	Grey	No	
006	0089_PW315	Clear Plastic Bottle - Natural	250 mL	00070220025259	Green	No	
006	0089_PW315	Clear Plastic Bottle - Natural	250 mL	00070220025226	Green	No	
006	0089_PW315	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016810	Purple	No	
007	0089_PW314	HDPE (no PTFE)	20 mL	00350019151079	Grey	No	
007	0089_PW314	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016670	Purple	No	
007	0089_PW314	HDPE (no PTFE)	20 mL	00350019150828	Grey	No	
007	0089_PW314	Clear Plastic Bottle - Natural	250 mL	00070220025334	Green	No	
007	0089_PW314	Clear Plastic Bottle - Natural	250 mL	00070220025279	Green	No	
008	0089_PW306	Clear Plastic Bottle - Natural	250 mL	00071018014802	Green	No	
008	0089_PW306	HDPE (no PTFE)	20 mL	00350019151057	Grey	No	
008	0089_PW306	HDPE (no PTFE)	20 mL	00350019130910	Grey	No	
008	0089_PW306	HDPE (no PTFE)	20 mL	00350019150849	Grey	No	
008	0089_PW306	Amber TOC Vial - Sulfuric Acid	40 mL	00181020019415	Purple	No	
008	0089_PW306	HDPE (no PTFE)	20 mL	00350019151524	Grey	No	
009	0089_SW309	Clear Plastic Bottle - Natural	250 mL	00070220025387	Green	No	
009	0089_SW309	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016818	Purple	No	
009	0089_SW309	HDPE (no PTFE)	20 mL	00350019151295	Grey	No	
009	0089_SW309	HDPE (no PTFE)	20 mL	00350019150806	Grey	No	
009	0089_SW309	Clear Plastic Bottle - Natural	250 mL	00070220025288	Green	No	
009	0089_SW309	HDPE (no PTFE)	20 mL	00350019150908	Grey	No	
009	0089_SW309	HDPE (no PTFE)	20 mL	00350019151210	Grey	No	
010	0089_PW415	Clear Plastic Bottle - Natural	250 mL	00071018014811	Green	No	
010	0089_PW415	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001225	Purple	No	
010	0089_PW415	HDPE (no PTFE)	20 mL	00350019102474	Grey	No	
010	0089_PW415	HDPE (no PTFE)	20 mL	00350019102478	Grey	No	
011	0089_PW413	HDPE (no PTFE)	20 mL	00350019164099	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: **23914** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

011	0089_PW413	HDPE (no PTFE)	20 mL	00350019126805	Grey	No	
011	0089_PW413	Clear Plastic Bottle - Natural	250 mL	00071018014821	Green	No	
011	0089_PW413	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001099	Purple	No	
012	0089_PW411	HDPE (no PTFE)	20 mL	00350019126790	Grey	No	
012	0089_PW411	HDPE (no PTFE)	20 mL	00350019163863	Grey	No	
012	0089_PW411	Clear Plastic Bottle - Natural	250 mL	00071018014852	Green	No	
012	0089_PW411	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001237	Purple	No	

Total Bottle Count: ALS: 60, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106520**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021 17:10
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23915	Issue Date	: 21-Jun-2021 13:46
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 9		
No. of samples analysed	: 9		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD308_210609	0089_SD316_210609	0089_SD307_210609	0089_SD315_210609	0089_SD314_210609
				Sampling date / time	09-Jun-2021 13:06	09-Jun-2021 13:16	09-Jun-2021 13:28	09-Jun-2021 13:35	09-Jun-2021 13:42
					EP2106520-001	EP2106520-002	EP2106520-003	EP2106520-004	EP2106520-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**9.7**	**9.6**	**9.6**	**9.7**	**9.6**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**985**	**1110**	**1230**	**818**	**1160**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**5.2**	**5.3**	**9.4**	**5.0**	**10.0**
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**2.1**	**2.3**	**2.9**	**2.6**	**2.9**
Exchangeable Magnesium	----	0.1	meq/100g		**0.3**	**0.3**	**0.3**	**0.3**	**0.3**
Exchangeable Potassium	----	0.1	meq/100g		<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
Cation Exchange Capacity	----	0.1	meq/100g		**2.5**	**2.7**	**3.4**	**3.0**	**3.4**
Exchangeable Sodium Percent	----	0.1	%		**5.3**	**4.0**	**3.2**	**3.5**	**3.6**
EP004: Organic Matter									
Organic Matter	----	0.5	%		**1.1**	<0.5	<0.5	<0.5	<0.5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD308_210609	0089_SD316_210609	0089_SD307_210609	0089_SD315_210609	0089_SD314_210609
				Sampling date / time	09-Jun-2021 13:06	09-Jun-2021 13:16	09-Jun-2021 13:28	09-Jun-2021 13:35	09-Jun-2021 13:42
Compound	CAS Number	LOR	Unit		EP2106520-001	EP2106520-002	EP2106520-003	EP2106520-004	EP2106520-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD308_210609	0089_SD316_210609	0089_SD307_210609	0089_SD315_210609	0089_SD314_210609
				Sampling date / time	09-Jun-2021 13:06	09-Jun-2021 13:16	09-Jun-2021 13:28	09-Jun-2021 13:35	09-Jun-2021 13:42
					EP2106520-001	EP2106520-002	EP2106520-003	EP2106520-004	EP2106520-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**102**	**114**	**104**	**109**	**108**
13C8-PFOA	----	0.0002	%		**102**	**103**	**100**	**102**	**101**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD306_210609	0089_SD415_210609	0089_SD413_210609	0089_SD411_210609	----
			Sampling date / time	09-Jun-2021 13:58	09-Jun-2021 14:30	09-Jun-2021 14:37	09-Jun-2021 14:45	----
Compound	CAS Number	LOR	Unit	EP2106520-006	EP2106520-007	EP2106520-008	EP2106520-009	--------
				Result	Result	Result	Result	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.3**	**9.3**	**9.2**	**9.2**	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**26000**	**25900**	**2080**	**31100**	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**21.2**	**20.4**	**18.3**	**22.2**	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**10.2**	**5.2**	**9.2**	**4.3**	----
Exchangeable Magnesium	----	0.1	meq/100g	**1.0**	**0.6**	**0.8**	**0.5**	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	----
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	**0.2**	**0.2**	**0.2**	----
Cation Exchange Capacity	----	0.1	meq/100g	**11.4**	**6.1**	**10.2**	**5.0**	----
Exchangeable Sodium Percent	----	0.1	%	**1.5**	**3.6**	**2.0**	**3.3**	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	**0.9**	**1.0**	**0.7**	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD306_210609	0089_SD415_210609	0089_SD413_210609	0089_SD411_210609	----
				Sampling date / time	09-Jun-2021 13:58	09-Jun-2021 14:30	09-Jun-2021 14:37	09-Jun-2021 14:45	----
Compound	CAS Number	LOR	Unit		EP2106520-006	EP2106520-007	EP2106520-008	EP2106520-009	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD306_210609	0089_SD415_210609	0089_SD413_210609	0089_SD411_210609	----
			Sampling date / time	09-Jun-2021 13:58	09-Jun-2021 14:30	09-Jun-2021 14:37	09-Jun-2021 14:45	----
Compound	CAS Number	LOR	Unit	EP2106520-006	EP2106520-007	EP2106520-008	EP2106520-009	--------
				Result	Result	Result	Result	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**104**	**112**	**104**	**110**	----
13C8-PFOA	----	0.0002	%	**102**	**103**	**92.5**	**104**	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106520**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 14-Jun-2021
C-O-C number	: 23915	Issue Date	: 21-Jun-2021
Sampler	: [redacted], [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 9		
No. of samples analysed	: 9		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3734068)									
EP2106518-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.6	9.7	0.0	0% - 20%
EP2106520-007	0089_SD415_210609	EA002: pH Value	----	0.1	pH Unit	9.3	9.3	0.0	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3734069)									
EP2106518-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	186	194	3.9	0% - 20%
EP2106520-007	0089_SD415_210609	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	25900	25600	1.2	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3733957)									
EP2106520-001	0089_SD308_210609	EA055: Moisture Content	----	0.1	%	5.2	5.6	7.3	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3738282)									
EP2106520-007	0089_SD415_210609	ED008: Exchangeable Sodium Percent	----	0.1	%	3.6	3.5	3.5	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	5.2	5.2	0.0	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.6	0.6	0.0	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.0	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	6.1	6.0	1.7	0% - 20%
EP004: Organic Matter (QC Lot: 3733940)									
EP2106520-001	0089_SD308_210609	EP004: Organic Matter	----	0.5	%	1.1	1.2	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3740904)									
EP2106466-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2106518-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3740904) - continued									
EP2106518-003	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0004	0.0004	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3740904)									
EP2106466-009	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2106518-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740904)									
EP2106466-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3740904) - continued									
EP2106466-009	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106518-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3740904)									
EP2106466-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106518-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3734068)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3734069)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	147 µS/cm	101	93.6	106
ED008: Exchangeable Cations (QCLot: 3738282)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	91.9	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	84.9	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	97.7	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	93.4	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	91.7	79.9	110
EP004: Organic Matter (QCLot: 3733940)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	86.1	70.0	120
				<0.5	85 %	90.8	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740904)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.8	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740904)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	94.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	110	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740904)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740904) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	112	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.1	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.6	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740904)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	100	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	111	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	107	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3740904)							
EP2106466-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	88.0	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	92.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	92.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	90.4	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	86.8	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	96.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740904)							
EP2106466-009	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	93.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	97.2	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	95.2	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	96.8	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	96.4	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	89.2	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	92.4	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3740904) - continued							
EP2106466-009	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	95.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	106	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	96.0	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	111	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3740904)							
EP2106466-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	122	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	110	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	105	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	97.6	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	99.8	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	82.0	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	97.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3740904)							
EP2106466-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	94.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	99.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	118	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	120	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106520**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 09-Jun-2021
Site	: DEF19009/Stirling	Issue Date	: 21-Jun-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 9
Order number	: DEF19009/730	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD308_210609, 0089_SD316_210609, 0089_SD307_210609, 0089_SD315_210609, 0089_SD314_210609, 0089_SD306_210609, 0089_SD415_210609, 0089_SD413_210609, 0089_SD411_210609	**09-Jun-2021**	**15-Jun-2021**	16-Jun-2021	✓	**15-Jun-2021**	15-Jun-2021	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD308_210609, 0089_SD316_210609, 0089_SD307_210609, 0089_SD315_210609, 0089_SD314_210609, 0089_SD306_210609, 0089_SD415_210609, 0089_SD413_210609, 0089_SD411_210609	**09-Jun-2021**	**15-Jun-2021**	16-Jun-2021	✓	**15-Jun-2021**	13-Jul-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD308_210609, 0089_SD316_210609, 0089_SD307_210609, 0089_SD315_210609, 0089_SD314_210609, 0089_SD306_210609, 0089_SD415_210609, 0089_SD413_210609, 0089_SD411_210609	**09-Jun-2021**	**----**	----	----	**14-Jun-2021**	23-Jun-2021	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD308_210609, 0089_SD316_210609, 0089_SD307_210609, 0089_SD315_210609, 0089_SD314_210609, 0089_SD306_210609, 0089_SD415_210609, 0089_SD413_210609, 0089_SD411_210609	**09-Jun-2021**	**16-Jun-2021**	07-Jul-2021	✓	**16-Jun-2021**	07-Jul-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD308_210609, 0089_SD316_210609, 0089_SD307_210609, 0089_SD315_210609, 0089_SD314_210609, 0089_SD306_210609, 0089_SD415_210609, 0089_SD413_210609, 0089_SD411_210609	**09-Jun-2021**	**15-Jun-2021**	07-Jul-2021	✓	**15-Jun-2021**	07-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD308_210609, 0089_SD316_210609, 0089_SD307_210609, 0089_SD315_210609, 0089_SD314_210609, 0089_SD306_210609, 0089_SD415_210609, 0089_SD413_210609, 0089_SD411_210609	**09-Jun-2021**	**17-Jun-2021**	06-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD308_210609, 0089_SD316_210609, 0089_SD307_210609, 0089_SD315_210609, 0089_SD314_210609, 0089_SD306_210609, 0089_SD415_210609, 0089_SD413_210609, 0089_SD411_210609	**09-Jun-2021**	**17-Jun-2021**	06-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD308_210609, 0089_SD316_210609, 0089_SD307_210609, 0089_SD315_210609, 0089_SD314_210609, 0089_SD306_210609, 0089_SD415_210609, 0089_SD413_210609, 0089_SD411_210609	**09-Jun-2021**	**17-Jun-2021**	06-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD308_210609, 0089_SD316_210609, 0089_SD307_210609, 0089_SD315_210609, 0089_SD314_210609, 0089_SD306_210609, 0089_SD415_210609, 0089_SD413_210609, 0089_SD411_210609	**09-Jun-2021**	**17-Jun-2021**	06-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD308_210609, 0089_SD316_210609, 0089_SD307_210609, 0089_SD315_210609, 0089_SD314_210609, 0089_SD306_210609, 0089_SD415_210609, 0089_SD413_210609, 0089_SD411_210609	**09-Jun-2021**	**17-Jun-2021**	06-Dec-2021	✓	**17-Jun-2021**	27-Jul-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106520**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23915	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 09-Jun-2021 17:10	Issue Date	: 10-Jun-2021
Client Requested Due Date	: 21-Jun-2021	Scheduled Reporting Date	: **21-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 5	Temperature	: 15.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 9 / 9

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2106520-001	09-Jun-2021 13:06	0089_SD308_210609	✓	✓	✓	✓
EP2106520-002	09-Jun-2021 13:16	0089_SD316_210609	✓	✓	✓	✓
EP2106520-003	09-Jun-2021 13:28	0089_SD307_210609	✓	✓	✓	✓
EP2106520-004	09-Jun-2021 13:35	0089_SD315_210609	✓	✓	✓	✓
EP2106520-005	09-Jun-2021 13:42	0089_SD314_210609	✓	✓	✓	✓
EP2106520-006	09-Jun-2021 13:58	0089_SD306_210609	✓	✓	✓	✓
EP2106520-007	09-Jun-2021 14:30	0089_SD415_210609	✓	✓	✓	✓
EP2106520-008	09-Jun-2021 14:37	0089_SD413_210609	✓	✓	✓	✓
EP2106520-009	09-Jun-2021 14:45	0089_SD411_210609	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2106520

Telephone : -- 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_C089_PFASOTP **Client:** CARDNO

Project Manager: [redacted]
Phone:)

23886 23915 23896 23898 23900

ALS Compass COC Reference: 23914 **# Samples:** 23899

Sampler: [redacted]
Phone:)

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send QC211 & QC212 to Eurofins

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
CARDNO	[redacted]		
Date / Time: 9/6/21	Date / Time: 1710 9/6/21	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: 23915 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD308		09/06/2021 01:06 PM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD316		09/06/2021 01:16 PM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD307		09/06/2021 01:28 PM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD315		09/06/2021 01:35 PM	Soil	ALS: 2 Non ALS: 0	No		X		
005	0089_SD314		09/06/2021 01:42 PM	Soil	ALS: 2 Non ALS: 0	No		X		
006	0089_SD306		09/06/2021 01:58 PM	Soil	ALS: 2 Non ALS: 0	No		X		
007	0089_SD415		09/06/2021 02:30 PM	Soil	ALS: 2 Non ALS: 0	No		X		
008	0089_SD413		09/06/2021 02:37 PM	Soil	ALS: 2 Non ALS: 0	No		X		
009	0089_SD411		09/06/2021 02:45 PM	Soil	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

(ALS) COC#: **23915** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: ah DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD308	Soil Glass Jar - Unpreserved	150 mL	00260121034919	Orange	No	
001	0089_SD308	HDPE Soil Jar	200 mL	00620719062520	Grey	No	
002	0089_SD316	HDPE Soil Jar	200 mL	00620719062501	Grey	No	
002	0089_SD316	Soil Glass Jar - Unpreserved	150 mL	00260121045333	Orange	No	
003	0089_SD307	Soil Glass Jar - Unpreserved	150 mL	00260121034901	Orange	No	
003	0089_SD307	HDPE Soil Jar	200 mL	00620719057167	Grey	No	
004	0089_SD315	HDPE Soil Jar	200 mL	00620719062558	Grey	No	
004	0089_SD315	Soil Glass Jar - Unpreserved	150 mL	00260121034938	Orange	No	
005	0089_SD314	Soil Glass Jar - Unpreserved	150 mL	00260121045319	Orange	No	
005	0089_SD314	HDPE Soil Jar	200 mL	00620719062489	Grey	No	
006	0089_SD306	Soil Glass Jar - Unpreserved	150 mL	00260121045313	Orange	No	
006	0089_SD306	HDPE Soil Jar	200 mL	00620719062549	Grey	No	
007	0089_SD415	Soil Glass Jar - Unpreserved	150 mL	00260121045281	Orange	No	
007	0089_SD415	HDPE Soil Jar	200 mL	00620719062479	Grey	No	
008	0089_SD413	Soil Glass Jar - Unpreserved	150 mL	00260121034859	Orange	No	
008	0089_SD413	HDPE Soil Jar	200 mL	00620719057172	Grey	No	
009	0089_SD411	HDPE Soil Jar	200 mL	00620719057228	Grey	No	
009	0089_SD411	Soil Glass Jar - Unpreserved	150 mL	00260121034916	Orange	No	

Total Bottle Count: ALS: 18, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106579**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021 13:45
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23952	Issue Date	: 22-Jun-2021 16:32
Sampler	: [redacted]		
Site	: MG DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 9		
No. of samples analysed	: 9		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW256_210610	0089_QC113_210610	0089_MW243_210610	0089_MW245_210610	0089_MW239_210610
			Sampling date / time	10-Jun-2021 08:10	10-Jun-2021 08:52	10-Jun-2021 09:48	10-Jun-2021 10:06	10-Jun-2021 10:20
Compound	CAS Number	LOR	Unit	EP2106579-001	EP2106579-002	EP2106579-003	EP2106579-004	EP2106579-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.70	7.56	8.09	7.30	7.99
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	819	816	469	753	412
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	267	1930	93	34	69
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	492	499	258	601	225
Total Alkalinity as CaCO3	----	1	mg/L	492	499	258	601	225
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	7	9	44	3	77
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	184	164	42	23	32
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	150	153	106	187	82
Magnesium	7439-95-4	1	mg/L	41	41	16	22	23
Sodium	7440-23-5	1	mg/L	95	105	31	24	27
Potassium	7440-09-7	1	mg/L	3	3	7	6	4
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	15.2	14.8	7.26	12.7	7.00
ø Total Cations	----	0.01	meq/L	15.1	15.6	8.13	12.3	7.26
ø Ionic Balance	----	0.01	%	0.32	2.86	5.70	1.52	1.82
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	21	22	4	107	4
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	1.28	1.40	<0.02	<0.02	0.03
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	3.05	2.68	<0.02	<0.02	0.07
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	38.8	34.4	0.07	0.05	0.03
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	2.11	1.88	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW256_210610	0089_QC113_210610	0089_MW243_210610	0089_MW245_210610	0089_MW239_210610
				Sampling date / time	10-Jun-2021 08:10	10-Jun-2021 08:52	10-Jun-2021 09:48	10-Jun-2021 10:06	10-Jun-2021 10:20
Compound	CAS Number	LOR	Unit		EP2106579-001	EP2106579-002	EP2106579-003	EP2106579-004	EP2106579-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**36.2**	**30.6**	**0.70**	**0.14**	**0.01**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.3**	**0.3**	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.67**	**0.70**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**3.96**	**4.21**	<0.02	<0.02	**0.07**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.70**	**0.76**	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**2.34**	**2.45**	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.10**	**0.10**	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		**0.08**	**0.07**	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW256_210610	0089_QC113_210610	0089_MW243_210610	0089_MW245_210610	0089_MW239_210610
				Sampling date / time	10-Jun-2021 08:10	10-Jun-2021 08:52	10-Jun-2021 09:48	10-Jun-2021 10:06	10-Jun-2021 10:20
Compound	CAS Number	LOR	Unit		EP2106579-001	EP2106579-002	EP2106579-003	EP2106579-004	EP2106579-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**0.14**	**0.13**	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**89.7**	**79.7**	**0.77**	**0.19**	**0.21**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**75.0**	**65.0**	**0.77**	**0.19**	**0.04**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**84.4**	**75.0**	**0.77**	**0.19**	**0.14**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**118**	**106**	**112**	**110**	**113**
13C8-PFOA	----	0.02	%		**102**	**104**	**99.2**	**109**	**98.8**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW236_210610	0089_MW373_210610	0089_MW196_210610	0089_MW173_210610	----
			Sampling date / time	10-Jun-2021 10:46	10-Jun-2021 11:39	10-Jun-2021 13:45	10-Jun-2021 14:10	----
Compound	CAS Number	LOR	Unit	EP2106579-006	EP2106579-007	EP2106579-008	EP2106579-009	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**8.05**	**7.64**	**8.00**	**7.72**	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**420**	**39200**	**396**	**2210**	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**85**	**325**	**1200**	**61**	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**243**	**151**	**210**	**668**	----
Total Alkalinity as CaCO3	----	1	mg/L	**243**	**151**	**210**	**668**	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**16**	**2600**	**21**	**194**	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**36**	**18400**	**32**	**813**	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**97**	**486**	**72**	**82**	----
Magnesium	7439-95-4	1	mg/L	**17**	**1540**	**20**	**126**	----
Sodium	7440-23-5	1	mg/L	**19**	**11700**	**28**	**544**	----
Potassium	7440-09-7	1	mg/L	**2**	**629**	**3**	**54**	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**6.20**	**576**	**5.54**	**40.3**	----
ø Total Cations	----	0.01	meq/L	**7.12**	**676**	**6.53**	**39.5**	----
ø Ionic Balance	----	0.01	%	**6.86**	**7.97**	**8.27**	**1.02**	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**5**	**12**	**5**	**45**	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	**0.18**	<0.02	<0.02	**0.29**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	**0.36**	<0.02	<0.02	**0.31**	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**11.3**	<0.02	<0.02	**6.64**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	**0.50**	<0.02	<0.02	**1.21**	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW236_210610	0089_MW373_210610	0089_MW196_210610	0089_MW173_210610	----
				Sampling date / time	10-Jun-2021 10:46	10-Jun-2021 11:39	10-Jun-2021 13:45	10-Jun-2021 14:10	----
Compound	CAS Number	LOR	Unit		EP2106579-006	EP2106579-007	EP2106579-008	EP2106579-009	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**42.2**	**0.02**	<0.01	**6.41**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	**0.1**	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.12**	<0.02	<0.02	**0.32**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.78**	<0.02	<0.02	**0.80**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.25**	<0.02	<0.02	**0.25**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**1.27**	<0.01	<0.01	**1.10**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**1.98**	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW236_210610	0089_MW373_210610	0089_MW196_210610	0089_MW173_210610	----
				Sampling date / time	10-Jun-2021 10:46	10-Jun-2021 11:39	10-Jun-2021 13:45	10-Jun-2021 14:10	----
					EP2106579-006	EP2106579-007	EP2106579-008	EP2106579-009	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	**0.23**	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**58.9**	**0.02**	<0.01	**17.7**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**53.5**	**0.02**	<0.01	**13.0**	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**56.1**	**0.02**	<0.01	**16.1**	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**107**	**108**	**112**	**108**	----
13C8-PFOA	----	0.02	%		**101**	**103**	**99.8**	**103**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106579**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	[redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23952	Issue Date	: 22-Jun-2021
Sampler	: [redacted] [redacted]		
Site	: MG DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 9		
No. of samples analysed	: 9		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3743988)									
EP2106579-005	0089_MW239_210610	EA005-P: pH Value	----	0.01	pH Unit	7.99	7.92	0.9	0% - 20%
EP2106574-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.14	8.19	0.6	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3740698)									
EP2106579-001	0089_MW256_210610	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	819	788	3.9	0% - 20%
EP2106579-009	0089_MW173_210610	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2210	2180	1.7	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3740699)									
EP2106579-001	0089_MW256_210610	EA025H: Suspended Solids (SS)	----	5	mg/L	267	273	2.0	0% - 20%
EP2106588-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	393	393	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3743985)									
EP2106572-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	62	62	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	62	62	0.0	0% - 20%
EP2106561-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	22	21	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	22	21	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3743989)									
EP2106579-005	0089_MW239_210610	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	225	225	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	225	225	0.0	0% - 20%
EP2106582-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3743989) - continued									
EP2106582-003	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	219	220	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	219	220	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734684)									
EP2106514-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	158	159	0.0	0% - 20%
EP2106579-001	0089_MW256_210610	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	7	7	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734686)									
EP2106579-004	0089_MW245_210610	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	3	0.0	No Limit
EP2106582-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2610	2630	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3734685)									
EP2106514-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1540	1520	0.6	0% - 20%
EP2106579-001	0089_MW256_210610	ED045G: Chloride	16887-00-6	1	mg/L	184	184	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3734687)									
EP2106579-004	0089_MW245_210610	ED045G: Chloride	16887-00-6	1	mg/L	23	22	0.0	0% - 20%
EP2106582-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18300	18500	1.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3739930)									
EP2106579-001	0089_MW256_210610	ED093F: Calcium	7440-70-2	1	mg/L	150	149	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	41	40	2.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	95	92	3.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EP2106580-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	98	98	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	18	18	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	66	67	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3736897)									
EP2106515-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	20	19	0.0	No Limit
EP2106579-003	0089_MW243_210610	EP005: Total Organic Carbon	----	1	mg/L	4	5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3746307)									
EP2106579-008	0089_MW196_210610	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3746307)									
EP2106579-008	0089_MW196_210610	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3746307) - continued									
EP2106579-008	0089_MW196_210610	EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3746307)									
EP2106579-008	0089_MW196_210610	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3746307)									
EP2106579-008	0089_MW196_210610	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3746307)									
EP2106579-008	0089_MW196_210610	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3743988)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	98.5	102
				----	7 pH Unit	99.6	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3740698)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	104	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3740699)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	97.9	89.1	120
				<5	1000 mg/L	100	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3743985)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	96.9	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3743989)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	94.9	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734684)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.3	87.7	113
				<1	500 mg/L	104	87.7	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734686)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	91.9	87.7	113
				<1	500 mg/L	103	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3734685)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.7	87.9	114
				<1	1000 mg/L	100	87.9	114
ED045G: Chloride by Discrete Analyser (QCLot: 3734687)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	101	87.9	114
				<1	1000 mg/L	100	87.9	114

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3739930)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.9	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.2	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3736897)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	100	87.2	116
				<1	100 mg/L	106	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746307)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	123	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	87.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	119	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	128	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746307)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	128	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	116	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	115	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	114	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	97.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	117	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	100	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746307)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	97.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	93.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	115	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	123	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	122	61.0	135

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746307)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	107	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	128	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	111	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	124	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734684)							
EP2106514-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	108	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734686)							
EP2106579-004	0089_MW245_210610	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	100	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3734685)							
EP2106514-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	99.2	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3734687)							
EP2106579-004	0089_MW245_210610	ED045G: Chloride	16887-00-6	1000 mg/L	97.8	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3736897)							
EP2106515-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	97.1	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	114	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	120	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	111	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	114	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	128	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	128	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	106	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	120	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	123	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	118	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	127	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	130	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	127	71.0	129

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746307) - continued							
EP2106582-004	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	122	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	108	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	98.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	85.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	119	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	115	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	125	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	111	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	114	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	121	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	113	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	122	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	106	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	115	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	105	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106579**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Site	: MG DEF19009/Stirling GW	Issue Date	: 22-Jun-2021
Sampler	: [redacted]	No. of samples received	: 9
Order number	: DEF19009/730	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	----	----	----	18-Jun-2021	10-Jun-2021	**8**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**----**	----	----	**18-Jun-2021**	10-Jun-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**----**	----	----	**18-Jun-2021**	24-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610	**10-Jun-2021**	**----**	----	----	**21-Jun-2021**	08-Jul-2021	✓
Clear Plastic Bottle - Natural (ED041G)							
0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**----**	----	----	**22-Jun-2021**	08-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610	**10-Jun-2021**	**----**	----	----	**21-Jun-2021**	08-Jul-2021	✓
Clear Plastic Bottle - Natural (ED045G)							
0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**----**	----	----	**22-Jun-2021**	08-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**----**	----	----	**15-Jun-2021**	08-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW256_210610, 0089_QC113_210610, 0089_MW243_210610, 0089_MW245_210610, 0089_MW239_210610, 0089_MW236_210610, 0089_MW373_210610, 0089_MW196_210610, 0089_MW173_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	**5.56**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106579**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23952	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: MG DEF19009/Stirling GW		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 11-Jun-2021 13:45	Issue Date	: 14-Jun-2021
Client Requested Due Date	: 22-Jun-2021	Scheduled Reporting Date	: **22-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.8 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 9 / 9

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106579-001	10-Jun-2021 08:10	0089_MW256_210610	✓	✓	✓	✓	✓	✓	✓
EP2106579-002	10-Jun-2021 08:52	0089_QC113_210610	✓	✓	✓	✓	✓	✓	✓
EP2106579-003	10-Jun-2021 09:48	0089_MW243_210610	✓	✓	✓	✓	✓	✓	✓
EP2106579-004	10-Jun-2021 10:06	0089_MW245_210610	✓	✓	✓	✓	✓	✓	✓
EP2106579-005	10-Jun-2021 10:20	0089_MW239_210610	✓	✓	✓	✓	✓	✓	✓
EP2106579-006	10-Jun-2021 10:46	0089_MW236_210610	✓	✓	✓	✓	✓	✓	✓
EP2106579-007	10-Jun-2021 11:39	0089_MW373_210610	✓	✓	✓	✓	✓	✓	✓
EP2106579-008	10-Jun-2021 13:45	0089_MW196_210610	✓	✓	✓	✓	✓	✓	✓
EP2106579-009	10-Jun-2021 14:10	0089_MW173_210610	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106579-001	10-Jun-2021 08:10	0089_MW256_210610	✓
EP2106579-002	10-Jun-2021 08:52	0089_QC113_210610	✓
EP2106579-003	10-Jun-2021 09:48	0089_MW243_210610	✓
EP2106579-004	10-Jun-2021 10:06	0089_MW245_210610	✓
EP2106579-005	10-Jun-2021 10:20	0089_MW239_210610	✓
EP2106579-006	10-Jun-2021 10:46	0089_MW236_210610	✓
EP2106579-007	10-Jun-2021 11:39	0089_MW373_210610	✓
EP2106579-008	10-Jun-2021 13:45	0089_MW196_210610	✓
EP2106579-009	10-Jun-2021 14:10	0089_MW173_210610	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
0089_MW173_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	✘	----	----
0089_MW196_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	✘	----	----
0089_MW236_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	✘	----	----
0089_MW239_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	✘	----	----
0089_MW243_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	✘	----	----
0089_MW245_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	✘	----	----
0089_MW256_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	✘	----	----
0089_MW373_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	✘	----	----
0089_QC113_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	✘	----	----

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email [redacted]
- Chain of Custody (CoC) (COC) — Email [redacted]
- EDI Format - ESDAT (ESDAT) — Email [redacted]
- EDI Format - XTab (XTAB) — Email [redacted]

CHAIN OF CUSTODY

ALS COC#: 23952 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW256		10/06/2021 08:10 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
002	0089_QC113		10/06/2021 08:52 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW243		10/06/2021 09:48 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
004	0089_MW245		10/06/2021 10:06 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
005	0089_MW239		10/06/2021 10:20 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
006	0089_MW236		10/06/2021 10:46 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
007	0089_MW373		10/06/2021 11:39 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
008	0089_MW196		10/06/2021 01:45 PM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8	X	extra PFAS for QC	
009	0089_MW173		10/06/2021 02:10 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		

Environmental Division Perth
Work Order Reference
EP2106579

Telephone : -- 61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 23952 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW256	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_QC113	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW243	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW245	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW239	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23952 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW236	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW373	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW196	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_MW173	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **23952** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW256	HDPE (no PTFE)	20 mL	00350019151158	Grey	No	
001	0089_MW256	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001042	Purple	No	
001	0089_MW256	HDPE (no PTFE)	20 mL	00350019150897	Grey	No	
001	0089_MW256	Clear Plastic Bottle - Natural	250 mL	00070220025349	Green	No	
001	0089_MW256	Clear Plastic Bottle - Natural	250 mL	00070220025470	Green	No	
002	0089_QC113	Amber TOC Vial - Sulfuric Acid	40 mL	00181020000942	Purple	No	
002	0089_QC113	Clear Plastic Bottle - Natural	250 mL	00070220025316	Green	No	
002	0089_QC113	HDPE (no PTFE)	20 mL	00350019151124	Grey	No	
002	0089_QC113	Clear Plastic Bottle - Natural	250 mL	00070220025360	Green	No	
002	0089_QC113	HDPE (no PTFE)	20 mL	00350019151161	Grey	No	
003	0089_MW243	Amber TOC Vial - Sulfuric Acid	40 mL	00181020000974	Purple	No	
003	0089_MW243	HDPE (no PTFE)	20 mL	00350019151228	Grey	No	
003	0089_MW243	HDPE (no PTFE)	20 mL	00350019151344	Grey	No	
003	0089_MW243	Clear Plastic Bottle - Natural	250 mL	00070220025352	Green	No	
003	0089_MW243	Clear Plastic Bottle - Natural	250 mL	00070220025375	Green	No	
004	0089_MW245	Clear Plastic Bottle - Natural	250 mL	00070220025406	Green	No	
004	0089_MW245	Clear Plastic Bottle - Natural	250 mL	00070220025508	Green	No	
004	0089_MW245	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001076	Purple	No	
004	0089_MW245	HDPE (no PTFE)	20 mL	00350019150829	Grey	No	
004	0089_MW245	HDPE (no PTFE)	20 mL	00350019150842	Grey	No	
005	0089_MW239	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001156	Purple	No	
005	0089_MW239	Clear Plastic Bottle - Natural	250 mL	00070220025600	Green	No	
005	0089_MW239	Clear Plastic Bottle - Natural	250 mL	00070220025602	Green	No	
005	0089_MW239	HDPE (no PTFE)	20 mL	00350019150898	Grey	No	
005	0089_MW239	HDPE (no PTFE)	20 mL	00350019151217	Grey	No	
006	0089_MW236	Clear Plastic Bottle - Natural	250 mL	00070220025351	Green	No	

CHAIN OF CUSTODY

ALS COC#: 23952 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW236	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001093	Purple	No	
006	0089_MW236	HDPE (no PTFE)	20 mL	00350019150798	Grey	No	
006	0089_MW236	HDPE (no PTFE)	20 mL	00350019150933	Grey	No	
006	0089_MW236	Clear Plastic Bottle - Natural	250 mL	00070220025393	Green	No	
007	0089_MW373	Clear Plastic Bottle - Natural	250 mL	00070220025315	Green	No	
007	0089_MW373	HDPE (no PTFE)	20 mL	00350019150949	Grey	No	
007	0089_MW373	Clear Plastic Bottle - Natural	250 mL	00070220025308	Green	No	
007	0089_MW373	HDPE (no PTFE)	20 mL	00350019150765	Grey	No	
007	0089_MW373	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001014	Purple	No	
008	0089_MW196	Amber TOC Vial - Sulfuric Acid	40 mL	00180820014394	Purple	No	
008	0089_MW196	Clear Plastic Bottle - Natural	250 mL	00070220025174	Green	No	
008	0089_MW196	Clear Plastic Bottle - Natural	250 mL	00070220025285	Green	No	
008	0089_MW196	HDPE (no PTFE)	20 mL	00350019151290	Grey	No	
008	0089_MW196	HDPE (no PTFE)	20 mL	00352010040035	Grey	No	
008	0089_MW196	HDPE (no PTFE)	20 mL	00350019151231	Grey	No	
008	0089_MW196	HDPE (no PTFE)	20 mL	00352010040192	Grey	No	
009	0089_MW173	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001027	Purple	No	
009	0089_MW173	HDPE (no PTFE)	20 mL	00350019150884	Grey	No	
009	0089_MW173	Clear Plastic Bottle - Natural	250 mL	00070220025504	Green	No	
009	0089_MW173	Clear Plastic Bottle - Natural	250 mL	00070220025536	Green	No	
009	0089_MW173	HDPE (no PTFE)	20 mL	00350019150886	Grey	No	

Total Bottle Count: ALS: 47, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106580**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021 13:45
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23953	Issue Date	: 23-Jun-2021 12:17
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling GW - JS		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_MW259_210610	0089_MW255_210610	0089_MW240_210610	0089_MW245_210610	0089_PW346_210610
			Sampling date / time	10-Jun-2021 08:38	10-Jun-2021 09:03	10-Jun-2021 09:42	10-Jun-2021 10:28	10-Jun-2021 11:46
Compound	CAS Number	LOR	Unit	EP2106580-001	EP2106580-002	EP2106580-003	EP2106580-004	EP2106580-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.93	7.92	8.00	8.10	7.55
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	324	554	620	460	38000
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	86	7590	89	169	923
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	224	352	249	198	271
Total Alkalinity as CaCO3	----	1	mg/L	224	352	249	198	271
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	17	30	71	70	2490
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	36	64	59	42	17600
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	72	98	124	86	469
Magnesium	7439-95-4	1	mg/L	15	18	16	18	1380
Sodium	7440-23-5	1	mg/L	27	66	34	32	10300
Potassium	7440-09-7	1	mg/L	3	4	4	4	608
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	5.84	9.46	8.12	6.60	554
ø Total Cations	----	0.01	meq/L	6.08	9.34	9.08	7.27	600
ø Ionic Balance	----	0.01	%	1.96	0.63	5.63	4.82	4.06
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	5	36	6	6	103
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.07	0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.04	0.08	0.21	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.13	1.15	3.24	0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.12	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW259_210610	0089_MW255_210610	0089_MW240_210610	0089_MW245_210610	0089_PW346_210610
				Sampling date / time	10-Jun-2021 08:38	10-Jun-2021 09:03	10-Jun-2021 09:42	10-Jun-2021 10:28	10-Jun-2021 11:46
Compound	CAS Number	LOR	Unit		EP2106580-001	EP2106580-002	EP2106580-003	EP2106580-004	EP2106580-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.41**	**0.53**	<0.01	<0.01	**0.03**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.09**	**0.04**	**0.02**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.16**	**0.17**	**0.21**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.02**	**0.04**	**0.03**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.01**	**0.16**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW259_210610	0089_MW255_210610	0089_MW240_210610	0089_MW245_210610	0089_PW346_210610
				Sampling date / time	10-Jun-2021 08:38	10-Jun-2021 09:03	10-Jun-2021 09:42	10-Jun-2021 10:28	10-Jun-2021 11:46
					EP2106580-001	EP2106580-002	EP2106580-003	EP2106580-004	EP2106580-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	**0.05**	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.85**	**2.14**	**4.01**	**0.02**	**0.03**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.54**	**1.68**	**3.24**	**0.02**	**0.03**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.81**	**2.06**	**3.68**	**0.02**	**0.03**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**116**	**104**	**106**	**110**
13C8-PFOA	----	0.02	%		**105**	**104**	**104**	**102**	**103**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW193_210610	----	----	----	----
				Sampling date / time	10-Jun-2021 14:22	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2106580-006	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.71**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**2180**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**2160**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**492**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**492**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**111**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**843**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**123**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**111**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**480**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**36**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**35.9**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**37.1**	----	----	----	----
ø Ionic Balance	----	0.01	%		**1.58**	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**36**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.89**	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**1.06**	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**8.21**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.45**	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW193_210610	----	----	----	----
				Sampling date / time	10-Jun-2021 14:22	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2106580-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**1.90**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.2**	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.36**	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**2.01**	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.17**	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.49**	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW193_210610	----	----	----	----
				Sampling date / time	10-Jun-2021 14:22	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2106580-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**15.7**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**10.1**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**14.2**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**111**	----	----	----	----
13C8-PFOA	----	0.02	%		**103**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106580**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23953	Issue Date	: 23-Jun-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling GW - JS		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA005P: pH by PC Titrator (QC Lot: 3743988)									
EP2106579-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.99	7.92	0.9	0% - 20%
EP2106574-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.14	8.19	0.6	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3740709)									
EP2106580-001	0089_MW259_210610	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	324	324	0.3	0% - 20%
EP2106582-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	35200	35000	0.3	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3740710)									
EP2106580-001	0089_MW259_210610	EA025H: Suspended Solids (SS)	----	5	mg/L	86	93	8.4	0% - 50%
EP2106590-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	40	46	12.8	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3743989)									
EP2106579-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	225	225	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	225	225	0.0	0% - 20%
EP2106582-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	219	220	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	219	220	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734688)									
EP2106580-001	0089_MW259_210610	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	17	16	0.0	0% - 50%
EP2106588-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	156	155	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3734689)									
EP2106580-001	0089_MW259_210610	ED045G: Chloride	16887-00-6	1	mg/L	36	36	0.0	0% - 20%
EP2106588-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	792	806	1.7	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3739930)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3739930) - continued									
EP2106579-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	150	149	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	41	40	2.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	95	92	3.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EP2106580-002	0089_MW255_210610	ED093F: Calcium	7440-70-2	1	mg/L	98	98	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	18	18	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	66	67	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3736897)									
EP2106515-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	20	19	0.0	No Limit
EP2106579-003	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	5	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3736973)									
EP2106580-002	0089_MW255_210610	EP005: Total Organic Carbon	----	1	mg/L	36	35	3.1	No Limit
EP2106582-006	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	6	26.4	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3743988)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	98.5	102
				----	7 pH Unit	99.6	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3740709)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	105	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3740710)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	96.8	89.1	120
				<5	1000 mg/L	103	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3743989)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	94.9	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734688)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	87.7	113
				<1	500 mg/L	101	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3734689)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	104	87.9	114
				<1	1000 mg/L	99.9	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3739930)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.9	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.2	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3736897)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	100	87.2	116
				<1	100 mg/L	106	87.2	116
EP005: Total Organic Carbon (TOC) (QCLot: 3736973)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	98.0	87.2	116
				<1	100 mg/L	103	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3747770)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3747770) - continued								
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	118	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	117	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	112	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	107	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	114	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3747770)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	105	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	117	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	128	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	120	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	111	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	129	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	115	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	119	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3747770)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	107	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	115	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	109	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	115	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	123	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	124	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	128	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3747770)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	119	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	112	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	110	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	101	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734688)							
EP2106580-001	0089_MW259_210610	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	97.1	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3734689)							
EP2106580-001	0089_MW259_210610	ED045G: Chloride	16887-00-6	1000 mg/L	100	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3736897)							
EP2106515-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	97.1	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3736973)							
EP2106580-003	0089_MW240_210610	EP005: Total Organic Carbon	----	100 mg/L	102	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106580**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Site	: DEF19009/Stirling GW - JS	Issue Date	: 23-Jun-2021
Sampler	: [redacted]	No. of samples received	: 6
Order number	: DEF19009/730	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_MW259_210610,	0089_MW255_210610,	----	----	----	18-Jun-2021	10-Jun-2021	**8**
0089_MW240_210610,	0089_MW245_210610,						
0089_PW346_210610,	0089_MW193_210610						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	10	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	10	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_MW259_210610,	0089_MW255_210610,	**10-Jun-2021**	**----**	----	----	**18-Jun-2021**	10-Jun-2021	×
0089_MW240_210610,	0089_MW245_210610,							
0089_PW346_210610,	0089_MW193_210610							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_MW259_210610,	0089_MW255_210610,	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
0089_MW240_210610,	0089_MW245_210610,							
0089_PW346_210610,	0089_MW193_210610							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW259_210610, 0089_MW255_210610, 0089_MW240_210610, 0089_MW245_210610, 0089_PW346_210610, 0089_MW193_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW259_210610, 0089_MW255_210610, 0089_MW240_210610, 0089_MW245_210610, 0089_PW346_210610, 0089_MW193_210610	**10-Jun-2021**	**----**	----	----	**18-Jun-2021**	24-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW259_210610, 0089_MW255_210610, 0089_MW240_210610, 0089_MW245_210610, 0089_PW346_210610, 0089_MW193_210610	**10-Jun-2021**	**----**	----	----	**22-Jun-2021**	08-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW259_210610, 0089_MW255_210610, 0089_MW240_210610, 0089_MW245_210610, 0089_PW346_210610, 0089_MW193_210610	**10-Jun-2021**	**----**	----	----	**22-Jun-2021**	08-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW259_210610, 0089_MW255_210610, 0089_MW240_210610, 0089_MW245_210610, 0089_PW346_210610, 0089_MW193_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW259_210610, 0089_MW255_210610, 0089_MW240_210610, 0089_MW245_210610, 0089_PW346_210610, 0089_MW193_210610	**10-Jun-2021**	**----**	----	----	**15-Jun-2021**	08-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW259_210610, 0089_MW255_210610, 0089_MW240_210610, 0089_MW245_210610, 0089_PW346_210610, 0089_MW193_210610	**10-Jun-2021**	**22-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	07-Dec-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW259_210610, 0089_MW255_210610, 0089_MW240_210610, 0089_MW245_210610, 0089_PW346_210610, 0089_MW193_210610	**10-Jun-2021**	**22-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	07-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW259_210610, 0089_MW255_210610, 0089_MW240_210610, 0089_MW245_210610, 0089_PW346_210610, 0089_MW193_210610	**10-Jun-2021**	**22-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	07-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW259_210610, 0089_MW255_210610, 0089_MW240_210610, 0089_MW245_210610, 0089_PW346_210610, 0089_MW193_210610	**10-Jun-2021**	**22-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	07-Dec-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW259_210610, 0089_MW255_210610, 0089_MW240_210610, 0089_MW245_210610, 0089_PW346_210610, 0089_MW193_210610	**10-Jun-2021**	**22-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	07-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	10	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	10	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106580**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23953	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling GW - JS		
Sampler	: [redacted]		

Dates

Date Samples Received	: 11-Jun-2021 13:45	Issue Date	: 14-Jun-2021
Client Requested Due Date	: 22-Jun-2021	Scheduled Reporting Date	: **22-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.8 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 6 / 6

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106580-001	10-Jun-2021 08:38	0089_MW259_210610	✓	✓	✓	✓	✓	✓	✓
EP2106580-002	10-Jun-2021 09:03	0089_MW255_210610	✓	✓	✓	✓	✓	✓	✓
EP2106580-003	10-Jun-2021 09:42	0089_MW240_210610	✓	✓	✓	✓	✓	✓	✓
EP2106580-004	10-Jun-2021 10:28	0089_MW245_210610	✓	✓	✓	✓	✓	✓	✓
EP2106580-005	10-Jun-2021 11:46	0089_PW346_210610	✓	✓	✓	✓	✓	✓	✓
EP2106580-006	10-Jun-2021 14:22	0089_MW193_210610	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106580-001	10-Jun-2021 08:38	0089_MW259_210610	✓
EP2106580-002	10-Jun-2021 09:03	0089_MW255_210610	✓
EP2106580-003	10-Jun-2021 09:42	0089_MW240_210610	✓
EP2106580-004	10-Jun-2021 10:28	0089_MW245_210610	✓
EP2106580-005	10-Jun-2021 11:46	0089_PW346_210610	✓
EP2106580-006	10-Jun-2021 14:22	0089_MW193_210610	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
0089_MW193_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_MW240_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_MW245_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_MW255_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_MW259_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----

0089_PW346_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	✘	----	----

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

CHAIN OF CUSTODY

COC#: **23953** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW - JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW259		10/06/2021 08:38 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
002	0089_MW255		10/06/2021 09:03 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
003	0089_MW240		10/06/2021 09:42 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
004	0089_MW245		10/06/2021 10:28 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
005	0089_PW346		10/06/2021 11:46 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
006	0089_MW193		10/06/2021 02:22 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		

Environmental Division Perth

Work Order Reference

EP2106580

Telephone : -- 61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 23953 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW - JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW259	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW255	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW240	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW245	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_PW346	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **23953** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW - JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW193	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **23953** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW - JS

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW259	Clear Plastic Bottle - Natural	250 mL	00070220025187	Green	No	
001	0089_MW259	Clear Plastic Bottle - Natural	250 mL	00070220025215	Green	No	
001	0089_MW259	HDPE (no PTFE)	20 mL	00350019150808	Grey	No	
001	0089_MW259	HDPE (no PTFE)	20 mL	00350019151265	Grey	No	
001	0089_MW259	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016839	Purple	No	
002	0089_MW255	HDPE (no PTFE)	20 mL	00350019150794	Grey	No	
002	0089_MW255	Clear Plastic Bottle - Natural	250 mL	00070220025185	Green	No	
002	0089_MW255	HDPE (no PTFE)	20 mL	00350019151345	Grey	No	
002	0089_MW255	Clear Plastic Bottle - Natural	250 mL	00070220025276	Green	No	
002	0089_MW255	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016714	Purple	No	
003	0089_MW240	Clear Plastic Bottle - Natural	250 mL	00070220025189	Green	No	
003	0089_MW240	Clear Plastic Bottle - Natural	250 mL	00070220025210	Green	No	
003	0089_MW240	HDPE (no PTFE)	20 mL	00350019151085	Grey	No	
003	0089_MW240	HDPE (no PTFE)	20 mL	00350019151354	Grey	No	
003	0089_MW240	Amber TOC Vial - Sulfuric Acid	40 mL	00181020000838	Purple	No	
004	0089_MW245	HDPE (no PTFE)	20 mL	00350019150948	Grey	No	
004	0089_MW245	Clear Plastic Bottle - Natural	250 mL	00070220025232	Green	No	
004	0089_MW245	HDPE (no PTFE)	20 mL	00350019151172	Grey	No	
004	0089_MW245	Clear Plastic Bottle - Natural	250 mL	00070220025214	Green	No	
004	0089_MW245	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016762	Purple	No	
005	0089_PW346	Clear Plastic Bottle - Natural	250 mL	00070220025554	Green	No	
005	0089_PW346	HDPE (no PTFE)	20 mL	00350019150843	Grey	No	
005	0089_PW346	HDPE (no PTFE)	20 mL	00350019150891	Grey	No	
005	0089_PW346	Clear Plastic Bottle - Natural	250 mL	00070220025304	Green	No	
005	0089_PW346	Amber TOC Vial - Sulfuric Acid	40 mL	00181020000789	Purple	No	
006	0089_MW193	Clear Plastic Bottle - Natural	250 mL	00070220025418	Green	No	

CHAIN OF CUSTODY

COC#: **23953** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW - JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW193	HDPE (no PTFE)	20 mL	00350019150980	Grey	No	
006	0089_MW193	Clear Plastic Bottle - Natural	250 mL	00070220025344	Green	No	
006	0089_MW193	HDPE (no PTFE)	20 mL	00350019151051	Grey	No	
006	0089_MW193	Amber TOC Vial - Sulfuric Acid	40 mL	00181020000995	Purple	No	

Total Bottle Count: ALS: 30, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106581**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021 13:45
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23981	Issue Date	: 23-Jun-2021 12:19
Sampler	: [redacted]		
Site	: MG DEF19009/Stirling SED		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD346_210610	0089_SD304_210610	0089_SD368_210610	0089_SD378_210610	0089_QC117_210610
				Sampling date / time	10-Jun-2021 11:46	10-Jun-2021 12:20	10-Jun-2021 12:36	10-Jun-2021 15:08	10-Jun-2021 15:11
					EP2106581-001	EP2106581-002	EP2106581-003	EP2106581-004	EP2106581-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**8.5**	**8.9**	**8.9**	**9.1**	**9.2**
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**114**	**3310**	**3200**	**3130**	**2570**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**25.7**	**25.4**	**26.2**	**22.8**	**17.9**
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		**9.1**	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		**0.7**	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		<0.1	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		**0.3**	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		**10.2**	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%		**3.3**	----	----	----	----
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	**2.9**	**4.5**	**4.0**	**2.3**
Exchangeable Magnesium	----	0.1	meq/100g		----	**0.4**	**0.5**	**0.4**	**0.3**
Exchangeable Potassium	----	0.1	meq/100g		----	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g		----	<0.1	**0.1**	**0.1**	**0.1**
Cation Exchange Capacity	----	0.1	meq/100g		----	**3.4**	**5.2**	**4.6**	**2.8**
Exchangeable Sodium Percent	----	0.1	%		----	**2.9**	**2.4**	**2.7**	**5.0**
EP004: Organic Matter									
Organic Matter	----	0.5	%		**2.3**	**1.0**	**1.1**	**0.9**	**1.1**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0028**	**0.0006**	**0.0010**	**0.0004**	**0.0003**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD346_210610	0089_SD304_210610	0089_SD368_210610	0089_SD378_210610	0089_QC117_210610
				Sampling date / time	10-Jun-2021 11:46	10-Jun-2021 12:20	10-Jun-2021 12:36	10-Jun-2021 15:08	10-Jun-2021 15:11
					EP2106581-001	EP2106581-002	EP2106581-003	EP2106581-004	EP2106581-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD346_210610	0089_SD304_210610	0089_SD368_210610	0089_SD378_210610	0089_QC117_210610
				Sampling date / time	10-Jun-2021 11:46	10-Jun-2021 12:20	10-Jun-2021 12:36	10-Jun-2021 15:08	10-Jun-2021 15:11
Compound	CAS Number	LOR	Unit		EP2106581-001	EP2106581-002	EP2106581-003	EP2106581-004	EP2106581-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0028**	**0.0006**	**0.0010**	**0.0004**	**0.0003**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0028**	**0.0006**	**0.0010**	**0.0004**	**0.0003**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0028**	**0.0006**	**0.0010**	**0.0004**	**0.0003**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**89.0**	**94.0**	**92.5**	**101**	**90.0**
13C8-PFOA	----	0.0002	%		**91.0**	**99.5**	**100**	**112**	**112**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD375_210610	0089_SD374_210610	----	----	----
			Sampling date / time	10-Jun-2021 15:30	10-Jun-2021 15:55	----	----	----
Compound	CAS Number	LOR	Unit	EP2106581-006	EP2106581-007	--------	--------	--------
				Result	Result	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.2**	**9.1**	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**2700**	**2800**	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**18.4**	**20.6**	----	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**4.9**	**11.8**	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.5**	**1.1**	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	**0.2**	**0.2**	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**5.6**	**13.1**	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**2.7**	**1.5**	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	**0.5**	<0.5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0004**	**0.0004**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD375_210610	0089_SD374_210610	----	----	----
				Sampling date / time	10-Jun-2021 15:30	10-Jun-2021 15:55	----	----	----
Compound	CAS Number	LOR	Unit		EP2106581-006	EP2106581-007	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0004**	**0.0004**	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)			Sample ID	0089_SD375_210610	0089_SD374_210610	----	----	----
			Sampling date / time	10-Jun-2021 15:30	10-Jun-2021 15:55	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EP2106581-006**	**EP2106581-007**	--------	--------	--------
				Result	Result	----	----	----
EP231P: PFAS Sums - Continued								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0004**	**0.0004**	**----**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0004**	**0.0004**	**----**	**----**	**----**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**86.5**	**91.0**	**----**	**----**	**----**
13C8-PFOA	----	0.0002	%	**108**	**118**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106581**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23981	Issue Date	: 23-Jun-2021
Sampler	: [redacted] [redacted]		
Site	: MG DEF19009/Stirling SED		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3738188)									
EP2106581-001	0089_SD346_210610	EA002: pH Value	----	0.1	pH Unit	8.5	8.7	2.4	0% - 20%
EP2106589-003	Anonymous	EA002: pH Value	----	0.1	pH Unit	9.3	9.3	0.0	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3738187)									
EP2106581-001	0089_SD346_210610	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	114	114	0.0	0% - 20%
EP2106589-003	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	545	551	1.1	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3735325)									
EP2106581-001	0089_SD346_210610	EA055: Moisture Content	----	0.1	%	25.7	25.7	0.0	0% - 20%
EP2106589-003	Anonymous	EA055: Moisture Content	----	0.1	%	18.9	18.6	1.5	0% - 20%
ED007: Exchangeable Cations (QC Lot: 3741015)									
EP2106581-001	0089_SD346_210610	ED007: Exchangeable Sodium Percent	----	0.1	%	3.3	3.6	7.8	0% - 20%
		ED007: Exchangeable Calcium	----	0.1	meq/100g	9.1	8.3	8.7	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	0.7	0.7	0.0	No Limit
		ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.3	0.3	0.0	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	10.2	9.4	8.5	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3739367)									
EP2106581-002	0089_SD304_210610	ED008: Exchangeable Sodium Percent	----	0.1	%	2.9	2.6	9.0	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	2.9	3.3	11.2	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.4	0.0	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.1	0.0	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	3.4	3.8	11.1	0% - 20%
EP004: Organic Matter (QC Lot: 3735327)									
EP2106581-001	0089_SD346_210610	EP004: Organic Matter	----	0.5	%	2.3	2.4	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP004: Organic Matter (QC Lot: 3735327) - continued									
EP2106589-004	Anonymous	EP004: Organic Matter	----	0.5	%	1.2	1.2	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3747827)									
EP2106581-001	0089_SD346_210610	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0028	0.0040	34.6	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2106589-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3747827)									
EP2106581-001	0089_SD346_210610	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2106589-004	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3747827)									
EP2106581-001	0089_SD346_210610	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3747827) - continued									
EP2106581-001	0089_SD346_210610	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106589-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3747827)									
EP2106581-001	0089_SD346_210610	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106589-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3747827) - continued									
EP2106589-004	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3738188)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	99.5	70.0	130
				----	7 pH Unit	99.7	70.0	130
EA010: Conductivity (1:5) (QCLot: 3738187)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	147 µS/cm	100	93.6	106
ED007: Exchangeable Cations (QCLot: 3741015)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	21.6 meq/100g	91.8	82.9	117
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.76 meq/100g	94.3	78.4	119
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	1 meq/100g	109	87.9	129
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.9 meq/100g	105	92.9	132
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	25.3 meq/100g	92.9	84.7	117
ED007: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Exchangeable Cations (QCLot: 3739367)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	97.5	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	92.6	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	99.6	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	100	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	97.3	79.9	110
EP004: Organic Matter (QCLot: 3735327)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	93.0	70.0	120
				<0.5	85 %	95.8	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3747827)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3747827)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	116	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.6	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	69.0	133

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3747827) - continued								
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3747827)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	115	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	105	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.5	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3747827)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	90.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	109	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	93.6	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.2	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3747827)							
EP2106581-001	0089_SD346_210610	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	101	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	96.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	97.2	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	94.0	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	132	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	116	59.0	134

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3747827)							
EP2106581-001	0089_SD346_210610	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	101	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	90.8	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	94.8	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	101	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	103	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	106	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	110	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	123	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	96.4	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	102	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	97.3	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3747827)							
EP2106581-001	0089_SD346_210610	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	96.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	121	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	101	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	105	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	85.6	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	95.6	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	93.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3747827)							
EP2106581-001	0089_SD346_210610	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	96.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	92.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	78.0	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	77.6	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106581**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Site	: MG DEF19009/Stirling SED	Issue Date	: 23-Jun-2021
Sampler	: [redacted]	No. of samples received	: 7
Order number	: DEF19009/730	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD346_210610, 0089_SD304_210610, 0089_SD368_210610, 0089_SD378_210610, 0089_QC117_210610, 0089_SD375_210610, 0089_SD374_210610	**10-Jun-2021**	**16-Jun-2021**	17-Jun-2021	✓	**16-Jun-2021**	16-Jun-2021	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD346_210610, 0089_SD304_210610, 0089_SD368_210610, 0089_SD378_210610, 0089_QC117_210610, 0089_SD375_210610, 0089_SD374_210610	**10-Jun-2021**	**16-Jun-2021**	17-Jun-2021	✓	**16-Jun-2021**	14-Jul-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD346_210610, 0089_SD304_210610, 0089_SD368_210610, 0089_SD378_210610, 0089_QC117_210610, 0089_SD375_210610, 0089_SD374_210610	**10-Jun-2021**	**----**	----	----	**15-Jun-2021**	24-Jun-2021	✓
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED007)							
0089_SD346_210610	**10-Jun-2021**	**17-Jun-2021**	08-Jul-2021	✓	**17-Jun-2021**	08-Jul-2021	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD304_210610, 0089_SD368_210610, 0089_SD378_210610, 0089_QC117_210610, 0089_SD375_210610, 0089_SD374_210610	**10-Jun-2021**	**17-Jun-2021**	08-Jul-2021	✓	**17-Jun-2021**	08-Jul-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD346_210610, 0089_SD304_210610, 0089_SD368_210610, 0089_SD378_210610, 0089_QC117_210610, 0089_SD375_210610, 0089_SD374_210610	**10-Jun-2021**	**21-Jun-2021**	08-Jul-2021	✓	**21-Jun-2021**	08-Jul-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD346_210610, 0089_SD304_210610, 0089_SD368_210610, 0089_SD378_210610, 0089_QC117_210610, 0089_SD375_210610, 0089_SD374_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	31-Jul-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD346_210610, 0089_SD304_210610, 0089_SD368_210610, 0089_SD378_210610, 0089_QC117_210610, 0089_SD375_210610, 0089_SD374_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	31-Jul-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD346_210610, 0089_SD304_210610, 0089_SD368_210610, 0089_SD378_210610, 0089_QC117_210610, 0089_SD375_210610, 0089_SD374_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	31-Jul-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD346_210610, 0089_SD304_210610, 0089_SD368_210610, 0089_SD378_210610, 0089_QC117_210610, 0089_SD375_210610, 0089_SD374_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	31-Jul-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD346_210610, 0089_SD304_210610, 0089_SD368_210610, 0089_SD378_210610, 0089_QC117_210610, 0089_SD375_210610, 0089_SD374_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	31-Jul-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106581**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: +[redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23981	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: MG DEF19009/Stirling SED		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 11-Jun-2021 13:45	Issue Date	: 14-Jun-2021
Client Requested Due Date	: 22-Jun-2021	Scheduled Reporting Date	: **22-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.8 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2106581-001	10-Jun-2021 11:46	0089_SD346_210610	✓	✓	✓	✓
EP2106581-002	10-Jun-2021 12:20	0089_SD304_210610	✓	✓	✓	✓
EP2106581-003	10-Jun-2021 12:36	0089_SD368_210610	✓	✓	✓	✓
EP2106581-004	10-Jun-2021 15:08	0089_SD378_210610	✓	✓	✓	✓
EP2106581-005	10-Jun-2021 15:11	0089_QC117_210610	✓	✓	✓	✓
EP2106581-006	10-Jun-2021 15:30	0089_SD375_210610	✓	✓	✓	✓
EP2106581-007	10-Jun-2021 15:55	0089_SD374_210610	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

CHAIN OF CUSTODY

COC#: 23981 ALS Laboratory: EP Perth

RELINQUISHED BY:		RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: [redacted] 11/6 1345	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD346		10/06/2021 11:46 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD304		10/06/2021 12:20 PM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_SD368		10/06/2021 12:36 PM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD378		10/06/2021 03:08 PM	Soil	ALS: 2 Non ALS: 0	No		X		
005	0089_QC117		10/06/2021 03:11 PM	Soil	ALS: 2 Non ALS: 0	No		X		
006	0089_SD375		10/06/2021 03:30 PM	Soil	ALS: 2 Non ALS: 0	No		X		
007	0089_SD374		10/06/2021 03:55 PM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division
Perth
Work Order Reference
EP2106581

Telephone : - 61-8-9406 1301

CHAIN OF CUSTODY

COC#: 23981 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD346	Soil Glass Jar - Unpreserved	150 mL	00260121034896	Orange	No	
001	0089_SD346	HDPE Soil Jar	200 mL	00620719062533	Grey	No	
002	0089_SD304	HDPE Soil Jar	200 mL	00620719057136	Grey	No	
002	0089_SD304	Soil Glass Jar - Unpreserved	150 mL	00260121045240	Orange	No	
003	0089_SD368	HDPE Soil Jar	200 mL	00620719062545	Grey	No	
003	0089_SD368	Soil Glass Jar - Unpreserved	150 mL	00260121045353	Orange	No	
004	0089_SD378	HDPE Soil Jar	200 mL	00620719062542	Grey	No	
004	0089_SD378	Soil Glass Jar - Unpreserved	150 mL	00260121045315	Orange	No	
005	0089_QC117	Soil Glass Jar - Unpreserved	150 mL	00260121045311	Orange	No	
005	0089_QC117	HDPE Soil Jar	200 mL	00620719062510	Grey	No	
006	0089_SD375	Soil Glass Jar - Unpreserved	150 mL	00260121045284	Orange	No	
006	0089_SD375	HDPE Soil Jar	200 mL	00620719062491	Grey	No	
007	0089_SD374	Soil Glass Jar - Unpreserved	150 mL	00260121045236	Orange	No	
007	0089_SD374	HDPE Soil Jar	200 mL	00620719062490	Grey	No	

Total Bottle Count: ALS: 14, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106582**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +[redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021 13:45
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23983	Issue Date	: 22-Jun-2021 16:38
Sampler	: [redacted]		
Site	: MG DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW378_210610	0089_QC118_210610	0089_PW375_210610	0089_SW318_210610	0089_PW374_210610
			Sampling date / time	10-Jun-2021 15:05	10-Jun-2021 15:30	10-Jun-2021 15:32	10-Jun-2021 15:38	10-Jun-2021 15:53
Compound	CAS Number	LOR	Unit	EP2106582-004	EP2106582-006	EP2106582-007	EP2106582-008	EP2106582-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.86	7.90	7.89	8.05	7.87
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	37600	42200	42800	42800	42100
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	60	139	64	20	136
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	131	124	118	114	120
Total Alkalinity as CaCO3	----	1	mg/L	131	124	118	114	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2580	2640	2610	2600	2600
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18600	18400	18600	18600	18500
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	470	483	485	467	462
Magnesium	7439-95-4	1	mg/L	1520	1570	1560	1510	1500
Sodium	7440-23-5	1	mg/L	11600	12000	12000	11600	11500
Potassium	7440-09-7	1	mg/L	630	654	649	628	618
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	581	576	581	581	578
ø Total Cations	----	0.01	meq/L	669	692	691	668	662
ø Ionic Balance	----	0.01	%	7.06	9.11	8.63	6.97	6.78
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	9	4	3	3	6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW378_210610	0089_QC118_210610	0089_PW375_210610	0089_SW318_210610	0089_PW374_210610
				Sampling date / time	10-Jun-2021 15:05	10-Jun-2021 15:30	10-Jun-2021 15:32	10-Jun-2021 15:38	10-Jun-2021 15:53
Compound	CAS Number	LOR	Unit		EP2106582-004	EP2106582-006	EP2106582-007	EP2106582-008	EP2106582-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.05**	**0.06**	**0.02**	<0.01	**0.08**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW378_210610	0089_QC118_210610	0089_PW375_210610	0089_SW318_210610	0089_PW374_210610
				Sampling date / time	10-Jun-2021 15:05	10-Jun-2021 15:30	10-Jun-2021 15:32	10-Jun-2021 15:38	10-Jun-2021 15:53
Compound	CAS Number	LOR	Unit		EP2106582-004	EP2106582-006	EP2106582-007	EP2106582-008	EP2106582-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.05**	**0.06**	**0.02**	<0.01	**0.08**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.05**	**0.06**	**0.02**	<0.01	**0.08**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.05**	**0.06**	**0.02**	<0.01	**0.08**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**112**	**101**	**114**	**111**	**109**
13C8-PFOA	----	0.02	%		**98.5**	**99.0**	**98.0**	**97.0**	**94.0**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	0089_PW304_210610	0089_SW305_210610	0089_PW368_210610	0089_SW317_210610	0089_SW319_210610
			Sampling date / time	10-Jun-2021 12:19	10-Jun-2021 12:30	10-Jun-2021 12:35	10-Jun-2021 15:12	10-Jun-2021 15:52
Compound	CAS Number	LOR	Unit	EP2106582-001	EP2106582-002	EP2106582-003	EP2106582-005	EP2106582-009
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.64	7.67	7.74	8.12	8.03
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	19800	41900	35200	42700	41900
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	1850	1530	172	14	18
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	657	144	219	113	115
Total Alkalinity as CaCO3	----	1	mg/L	657	144	219	113	115
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1380	2580	2150	2610	2600
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	10700	18600	16200	18300	18600
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	268	463	446	461	468
Magnesium	7439-95-4	1	mg/L	916	1500	1310	1500	1520
Sodium	7440-23-5	1	mg/L	5140	11400	9650	11500	11600
Potassium	7440-09-7	1	mg/L	357	615	530	621	626
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	344	581	506	573	581
ø Total Cations	----	0.01	meq/L	321	658	563	662	669
ø Ionic Balance	----	0.01	%	3.34	6.20	5.35	7.26	7.03
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	152	53	27	2	2
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW304_210610	0089_SW305_210610	0089_PW368_210610	0089_SW317_210610	0089_SW319_210610
				Sampling date / time	10-Jun-2021 12:19	10-Jun-2021 12:30	10-Jun-2021 12:35	10-Jun-2021 15:12	10-Jun-2021 15:52
Compound	CAS Number	LOR	Unit		EP2106582-001	EP2106582-002	EP2106582-003	EP2106582-005	EP2106582-009
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW304_210610	0089_SW305_210610	0089_PW368_210610	0089_SW317_210610	0089_SW319_210610
				Sampling date / time	10-Jun-2021 12:19	10-Jun-2021 12:30	10-Jun-2021 12:35	10-Jun-2021 15:12	10-Jun-2021 15:52
					EP2106582-001	EP2106582-002	EP2106582-003	EP2106582-005	EP2106582-009
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**114**	**118**	**106**	**120**	**112**
13C8-PFOA	----	0.02	%		**100**	**99.3**	**102**	**100**	**98.6**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106582**	Page	: 1 of 13
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23983	Issue Date	: 22-Jun-2021
Sampler	: [redacted] [redacted]		
Site	: MG DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3743988)									
EP2106579-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.99	7.92	0.9	0% - 20%
EP2106574-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.14	8.19	0.6	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3743990)									
EP2106582-003	0089_PW368_210610	EA005-P: pH Value	----	0.01	pH Unit	7.74	7.75	0.1	0% - 20%
EP2106582-010	0089_PW374_210610	EA005-P: pH Value	----	0.01	pH Unit	7.87	7.85	0.3	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3740709)									
EP2106580-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	324	324	0.3	0% - 20%
EP2106582-003	0089_PW368_210610	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	35200	35000	0.3	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3740755)									
EP2106582-004	0089_PW378_210610	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	37600	40700	7.7	0% - 20%
EP2106690-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	774	772	0.3	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3740710)									
EP2106580-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	86	93	8.4	0% - 50%
EP2106590-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	40	46	12.8	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3740756)									
EP2106582-004	0089_PW378_210610	EA025H: Suspended Solids (SS)	----	5	mg/L	60	57	3.9	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 3743989)									
EP2106579-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	225	225	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	225	225	0.0	0% - 20%
EP2106582-003	0089_PW368_210610	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	219	220	0.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 3743989) - continued									
EP2106582-003	0089_PW368_210610	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	219	220	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3743991)									
EP2106590-008	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	129	129	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	129	129	0.0	0% - 20%
EP2106582-010	0089_PW374_210610	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	120	123	2.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	120	123	2.2	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734686)									
EP2106579-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	3	0.0	No Limit
EP2106582-005	0089_SW317_210610	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2610	2630	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3734687)									
EP2106579-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	23	22	0.0	0% - 20%
EP2106582-005	0089_SW317_210610	ED045G: Chloride	16887-00-6	1	mg/L	18300	18500	1.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3739930)									
EP2106579-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	150	149	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	41	40	2.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	95	92	3.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EP2106580-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	98	98	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	18	18	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	66	67	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3739931)									
EP2106582-006	0089_QC118_210610	ED093F: Calcium	7440-70-2	1	mg/L	483	468	3.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1570	1520	3.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12000	11600	3.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	654	632	3.5	0% - 20%
EP2106588-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	153	158	3.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	142	149	4.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	686	728	5.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	53	56	6.2	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3736973)									
EP2106580-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	36	35	3.1	No Limit
EP2106582-006	0089_QC118_210610	EP005: Total Organic Carbon	----	1	mg/L	4	6	26.4	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3746244)									
EP2106582-008	0089_SW318_210610	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3746244) - continued									
EP2106582-008	0089_SW318_210610	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2106588-005	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	6.04	6.40	5.9	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.05	0.04	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.06	0.06	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.76	0.76	0.0	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.10	0.12	17.4	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3746244)									
EP2106582-008	0089_SW318_210610	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2106588-005	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.09	0.09	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.27	0.26	0.0	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.21	0.21	0.0	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.08	0.08	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3746244) - continued									
EP2106588-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3746244)									
EP2106582-008	0089_SW318_210610	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106588-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3746244)									
EP2106582-008	0089_SW318_210610	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106588-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3746244)									
EP2106582-008	0089_SW318_210610	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 3746244) - continued									
EP2106588-005	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	7.68	8.04	4.6	0% - 20%
EP231P: PFAS Sums (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3743988)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	98.5	102
				----	7 pH Unit	99.6	98.5	102
EA005P: pH by PC Titrator (QCLot: 3743990)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98.5	102
				----	7 pH Unit	99.7	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3740709)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	105	88.1	114
				<10	1000 mg/L	102	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3740755)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	100	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3740710)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	96.8	89.1	120
				<5	1000 mg/L	103	89.1	120
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3740756)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	98.4	89.1	120
				<5	1000 mg/L	101	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3743989)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	94.9	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3743991)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	112	81.2	126
				<1	200 mg/L	95.0	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734686)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	91.9	87.7	113
				<1	500 mg/L	103	87.7	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 3734687)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	101	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3739930)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.9	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.2	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.7	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3739931)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.3	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.4	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	90.5	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3736973)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	98.0	87.2	116
				<1	100 mg/L	103	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746244)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	116	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	113	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	111	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	125	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746307)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	123	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	87.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	119	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	128	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746244)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	102	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	122	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	120	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	126	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	125	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	120	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	125	69.0	133

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746244) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	100	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746307)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	128	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	116	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	115	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	114	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	97.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	117	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	100	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746244)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	96.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	124	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	114	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	115	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	120	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	110	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746307)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	97.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	93.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	115	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	123	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	122	61.0	135

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746244)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	114	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	120	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	122	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	121	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746307)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	107	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	128	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	111	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	124	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734686)							
EP2106579-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	100	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3734687)							
EP2106579-004	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	97.8	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3736973)							
EP2106580-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	102	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746244)							
EP2106588-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	112	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	123	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	119	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	117	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	115	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	125	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746307)							
EP2106582-004	0089_PW378_210610	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	114	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	120	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	111	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	114	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	128	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	128	53.0	142

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746244)							
EP2106588-004	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	108	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	125	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	123	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	126	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	129	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	122	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	120	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	122	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	124	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	102	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	110	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746307)							
EP2106582-004	0089_PW378_210610	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	106	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	120	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	123	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	118	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	127	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	130	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	127	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	122	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	108	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	98.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	85.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746244)							
EP2106588-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	95.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	96.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	103	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	118	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	112	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	118	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	123	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746307)							
EP2106582-004	0089_PW378_210610	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	119	67.0	137

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746307) - continued							
EP2106582-004	0089_PW378_210610	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	115	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	125	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	111	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	114	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	121	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	113	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746244)							
EP2106588-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	117	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	125	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	128	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	128	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746307)							
EP2106582-004	0089_PW378_210610	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	122	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	106	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	115	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	105	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106582**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Site	: MG DEF19009/Stirling SW/PW	Issue Date	: 22-Jun-2021
Sampler	: [redacted]	No. of samples received	: 10
Order number	: DEF19009/730	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_PW304_210610,	0089_SW305_210610,	----	----	----	18-Jun-2021	10-Jun-2021	**8**
0089_PW368_210610,	0089_PW378_210610,						
0089_SW317_210610,	0089_QC118_210610,						
0089_PW375_210610,	0089_SW318_210610,						
0089_SW319_210610,	0089_PW374_210610						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	3	38	7.89	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_PW304_210610,	0089_SW305_210610,	**10-Jun-2021**	**----**	----	----	**18-Jun-2021**	10-Jun-2021	×
0089_PW368_210610,	0089_PW378_210610,							
0089_SW317_210610,	0089_QC118_210610,							
0089_PW375_210610,	0089_SW318_210610,							
0089_SW319_210610,	0089_PW374_210610							
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
0089_PW304_210610,	0089_SW305_210610,	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
0089_PW368_210610,	0089_PW378_210610,							
0089_SW317_210610,	0089_QC118_210610,							
0089_PW375_210610,	0089_SW318_210610,							
0089_SW319_210610,	0089_PW374_210610							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_PW304_210610, 0089_SW305_210610, 0089_PW368_210610, 0089_PW378_210610, 0089_SW317_210610, 0089_QC118_210610, 0089_PW375_210610, 0089_SW318_210610, 0089_SW319_210610, 0089_PW374_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_PW304_210610, 0089_SW305_210610, 0089_PW368_210610, 0089_PW378_210610, 0089_SW317_210610, 0089_QC118_210610, 0089_PW375_210610, 0089_SW318_210610, 0089_SW319_210610, 0089_PW374_210610	**10-Jun-2021**	**----**	----	----	**18-Jun-2021**	24-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_PW304_210610, 0089_SW305_210610, 0089_PW368_210610, 0089_PW378_210610, 0089_SW317_210610, 0089_QC118_210610, 0089_PW375_210610, 0089_SW318_210610, 0089_SW319_210610, 0089_PW374_210610	**10-Jun-2021**	**----**	----	----	**22-Jun-2021**	08-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW304_210610, 0089_SW305_210610, 0089_PW368_210610, 0089_PW378_210610, 0089_SW317_210610, 0089_QC118_210610, 0089_PW375_210610, 0089_SW318_210610, 0089_SW319_210610, 0089_PW374_210610	**10-Jun-2021**	**----**	----	----	**22-Jun-2021**	08-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_PW304_210610, 0089_SW305_210610, 0089_PW368_210610, 0089_PW378_210610, 0089_SW317_210610, 0089_QC118_210610, 0089_PW375_210610, 0089_SW318_210610, 0089_SW319_210610, 0089_PW374_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_PW304_210610, 0089_SW305_210610, 0089_PW368_210610, 0089_PW378_210610, 0089_SW317_210610, 0089_QC118_210610, 0089_PW375_210610, 0089_SW318_210610, 0089_SW319_210610, 0089_PW374_210610	**10-Jun-2021**	**----**	----	----	**15-Jun-2021**	08-Jul-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW304_210610, 0089_SW305_210610, 0089_PW368_210610, 0089_PW378_210610, 0089_SW317_210610, 0089_QC118_210610, 0089_PW375_210610, 0089_SW318_210610, 0089_SW319_210610, 0089_PW374_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW304_210610, 0089_SW305_210610, 0089_PW368_210610, 0089_PW378_210610, 0089_SW317_210610, 0089_QC118_210610, 0089_PW375_210610, 0089_SW318_210610, 0089_SW319_210610, 0089_PW374_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW304_210610, 0089_SW305_210610, 0089_PW368_210610, 0089_PW378_210610, 0089_SW317_210610, 0089_QC118_210610, 0089_PW375_210610, 0089_SW318_210610, 0089_SW319_210610, 0089_PW374_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW304_210610, 0089_SW305_210610, 0089_PW368_210610, 0089_PW378_210610, 0089_SW317_210610, 0089_QC118_210610, 0089_PW375_210610, 0089_SW318_210610, 0089_SW319_210610, 0089_PW374_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW304_210610, 0089_SW305_210610, 0089_PW368_210610, 0089_PW378_210610, 0089_SW317_210610, 0089_QC118_210610, 0089_PW375_210610, 0089_SW318_210610, 0089_SW319_210610, 0089_PW374_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	38	**7.89**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	29	**10.34**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	29	**13.79**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106582**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23983	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: MG DEF19009/Stirling SW/PW		
Sampler	: [redacted]		

Dates

Date Samples Received	: 11-Jun-2021 13:45	Issue Date	: 14-Jun-2021
Client Requested Due Date	: 22-Jun-2021	Scheduled Reporting Date	: **22-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.8 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 10 / 10

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106582-001	10-Jun-2021 12:19	0089_PW304_210610	✓	✓	✓	✓	✓	✓	✓
EP2106582-002	10-Jun-2021 12:30	0089_SW305_210610	✓	✓	✓	✓	✓	✓	✓
EP2106582-003	10-Jun-2021 12:35	0089_PW368_210610	✓	✓	✓	✓	✓	✓	✓
EP2106582-004	10-Jun-2021 15:05	0089_PW378_210610	✓	✓	✓	✓	✓	✓	✓
EP2106582-005	10-Jun-2021 15:12	0089_SW317_210610	✓	✓	✓	✓	✓	✓	✓
EP2106582-006	10-Jun-2021 15:30	0089_QC118_210610	✓	✓	✓	✓	✓	✓	✓
EP2106582-007	10-Jun-2021 15:32	0089_PW375_210610	✓	✓	✓	✓	✓	✓	✓
EP2106582-008	10-Jun-2021 15:38	0089_SW318_210610	✓	✓	✓	✓	✓	✓	✓
EP2106582-009	10-Jun-2021 15:52	0089_SW319_210610	✓	✓	✓	✓	✓	✓	✓
EP2106582-010	10-Jun-2021 15:53	0089_PW374_210610	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106582-001	10-Jun-2021 12:19	0089_PW304_210610	✓
EP2106582-002	10-Jun-2021 12:30	0089_SW305_210610	✓
EP2106582-003	10-Jun-2021 12:35	0089_PW368_210610	✓
EP2106582-004	10-Jun-2021 15:05	0089_PW378_210610	✓
EP2106582-005	10-Jun-2021 15:12	0089_SW317_210610	✓
EP2106582-006	10-Jun-2021 15:30	0089_QC118_210610	✓
EP2106582-007	10-Jun-2021 15:32	0089_PW375_210610	✓
EP2106582-008	10-Jun-2021 15:38	0089_SW318_210610	✓
EP2106582-009	10-Jun-2021 15:52	0089_SW319_210610	✓
EP2106582-010	10-Jun-2021 15:53	0089_PW374_210610	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
0089_PW304_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_PW368_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_PW374_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_PW375_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_PW378_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_QC118_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_SW305_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_SW317_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_SW318_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_SW319_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

COC#: 23983 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW304		10/06/2021 12:19 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
002	0089_SW305		10/06/2021 12:30 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
003	0089_PW368		10/06/2021 12:35 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
004	0089_PW378		10/06/2021 03:05 PM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8	X	extra PFAS for QC	
005	0089_SW317		10/06/2021 03:12 PM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8	X		
006	0089_QC118		10/06/2021 03:30 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
007	0089_PW375		10/06/2021 03:32 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
008	0089_SW318		10/06/2021 03:38 PM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8	X	extra PFAS for QC	
009	0089_SW319		10/06/2021 03:52 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		

Environmental Division Perth

Work Order Reference

EP2106582

Telephone : -- 61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: 23983 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_PW374		10/06/2021 03:53 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

ALS COC#: 23983 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO:

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW304	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_SW305	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW368	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_PW378	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_SW317	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23983 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_QC118	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW375	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_SW318	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_SW319	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_PW374	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **23983** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW304	Clear Plastic Bottle - Natural	250 mL	00070220025342	Green	No	
001	0089_PW304	Clear Plastic Bottle - Natural	250 mL	00070220025313	Green	No	
001	0089_PW304	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001094	Purple	No	
001	0089_PW304	HDPE (no PTFE)	20 mL	00350019150873	Grey	No	
001	0089_PW304	HDPE (no PTFE)	20 mL	00350019150926	Grey	No	
002	0089_SW305	Clear Plastic Bottle - Natural	250 mL	00070220025347	Green	No	
002	0089_SW305	Clear Plastic Bottle - Natural	250 mL	00070220025379	Green	No	
002	0089_SW305	HDPE (no PTFE)	20 mL	00350019150762	Grey	No	
002	0089_SW305	HDPE (no PTFE)	20 mL	00350019151174	Grey	No	
002	0089_SW305	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016781	Purple	No	
003	0089_PW368	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016806	Purple	No	
003	0089_PW368	HDPE (no PTFE)	20 mL	00350019150901	Grey	No	
003	0089_PW368	HDPE (no PTFE)	20 mL	00350019151112	Grey	No	
003	0089_PW368	Clear Plastic Bottle - Natural	250 mL	00070220025383	Green	No	
003	0089_PW368	Clear Plastic Bottle - Natural	250 mL	00070220025534	Green	No	
004	0089_PW378	Clear Plastic Bottle - Natural	250 mL	00070220025366	Green	No	
004	0089_PW378	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001107	Purple	No	
004	0089_PW378	Clear Plastic Bottle - Natural	250 mL	00070220025394	Green	No	
004	0089_PW378	HDPE (no PTFE)	20 mL	00350019151146	Grey	No	
004	0089_PW378	HDPE (no PTFE)	20 mL	00350019150834	Grey	No	
004	0089_PW378	HDPE (no PTFE)	20 mL	00352010040357	Grey	No	
004	0089_PW378	HDPE (no PTFE)	20 mL	00352010040452	Grey	No	
005	0089_SW317	Clear Plastic Bottle - Natural	250 mL	00070220025517	Green	No	
005	0089_SW317	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001069	Purple	No	
005	0089_SW317	Clear Plastic Bottle - Natural	250 mL	00070220025398	Green	No	
005	0089_SW317	HDPE (no PTFE)	20 mL	00352010040475	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: **23983** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

005	0089_SW317	HDPE (no PTFE)	20 mL	00350019150807	Grey	No	
005	0089_SW317	HDPE (no PTFE)	20 mL	00350019151006	Grey	No	
005	0089_SW317	HDPE (no PTFE)	20 mL	00352010040201	Grey	No	
006	0089_QC118	Amber TOC Vial - Sulfuric Acid	40 mL	00181020000971	Purple	No	
006	0089_QC118	Clear Plastic Bottle - Natural	250 mL	00070220025213	Green	No	
006	0089_QC118	HDPE (no PTFE)	20 mL	00350019150865	Grey	No	
006	0089_QC118	HDPE (no PTFE)	20 mL	00350019150988	Grey	No	
006	0089_QC118	Clear Plastic Bottle - Natural	250 mL	00070220025603	Green	No	
007	0089_PW375	HDPE (no PTFE)	20 mL	00350019150796	Grey	No	
007	0089_PW375	Clear Plastic Bottle - Natural	250 mL	00070220025577	Green	No	
007	0089_PW375	HDPE (no PTFE)	20 mL	00350019150887	Grey	No	
007	0089_PW375	Clear Plastic Bottle - Natural	250 mL	00070220025298	Green	No	
007	0089_PW375	Amber TOC Vial - Sulfuric Acid	40 mL	00181020000982	Purple	No	
008	0089_SW318	Amber TOC Vial - Sulfuric Acid	40 mL	00181020000737	Purple	No	
008	0089_SW318	HDPE (no PTFE)	20 mL	00350019150821	Grey	No	
008	0089_SW318	HDPE (no PTFE)	20 mL	00350019151020	Grey	No	
008	0089_SW318	Clear Plastic Bottle - Natural	250 mL	00070220025433	Green	No	
008	0089_SW318	Clear Plastic Bottle - Natural	250 mL	00070220025493	Green	No	
008	0089_SW318	HDPE (no PTFE)	20 mL	00352010040210	Grey	No	
008	0089_SW318	HDPE (no PTFE)	20 mL	00352010040420	Grey	No	
009	0089_SW319	Clear Plastic Bottle - Natural	250 mL	00070220025329	Green	No	
009	0089_SW319	Clear Plastic Bottle - Natural	250 mL	00070220025291	Green	No	
009	0089_SW319	HDPE (no PTFE)	20 mL	00350019150770	Grey	No	
009	0089_SW319	HDPE (no PTFE)	20 mL	00350019150774	Grey	No	
009	0089_SW319	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016789	Purple	No	
010	0089_PW374	Clear Plastic Bottle - Natural	250 mL	00070220025551	Green	No	
010	0089_PW374	HDPE (no PTFE)	20 mL	00350019151036	Grey	No	

CHAIN OF CUSTODY

COC#: **23983** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: MG DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

010	0089_PW374	HDPE (no PTFE)	20 mL	00350019151103	Grey	No	
010	0089_PW374	Amber TOC Vial - Sulfuric Acid	40 mL	00181020000950	Purple	No	
010	0089_PW374	Clear Plastic Bottle - Natural	250 mL	00070220025337	Green	No	

Total Bottle Count: ALS: 56, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106588**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021 13:45
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23954	Issue Date	: 22-Jun-2021 18:16
Sampler	: [redacted], [redacted]		
Site	: Ah DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 14		
No. of samples analysed	: 14		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW226_210610	0089_MW228_210610 extra for qc	0089_MW202_210610	0089_MW158_210610 extra for qc	0089_MW161_210610 extra for qc
				Sampling date / time	10-Jun-2021 08:30	10-Jun-2021 09:56	10-Jun-2021 12:23	10-Jun-2021 13:35	10-Jun-2021 13:38
Compound	CAS Number	LOR	Unit		EP2106588-001	EP2106588-002	EP2106588-003	EP2106588-004	EP2106588-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.62	7.70	7.92	7.84	7.71
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		31200	23100	664	9280	2090
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		88	393	<5	5	686
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		561	328	320	418	324
Total Alkalinity as CaCO3	----	1	mg/L		561	328	320	418	324
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2250	1500	52	508	156
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		14800	11300	137	4700	792
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		452	310	104	204	139
Magnesium	7439-95-4	1	mg/L		1250	830	26	348	79
Sodium	7440-23-5	1	mg/L		9100	6050	94	2360	446
Potassium	7440-09-7	1	mg/L		538	324	7	113	39
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		476	356	11.3	152	32.1
ø Total Cations	----	0.01	meq/L		535	355	11.6	144	33.8
ø Ionic Balance	----	0.01	%		5.88	0.18	1.12	2.41	2.69
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		80	42	9	12	12
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.07	<0.02	<0.02	0.05
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	0.06
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	0.02	<0.02	0.76
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	0.10

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW226_210610	0089_MW228_210610 extra for qc	0089_MW202_210610	0089_MW158_210610 extra for qc	0089_MW161_210610 extra for qc
				Sampling date / time	10-Jun-2021 08:30	10-Jun-2021 09:56	10-Jun-2021 12:23	10-Jun-2021 13:35	10-Jun-2021 13:38
					EP2106588-001	EP2106588-002	EP2106588-003	EP2106588-004	EP2106588-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	**0.05**	<0.01	**6.04**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	**1.1**	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**5.09**	<0.02	<0.02	**0.27**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**4.65**	<0.02	<0.02	**0.21**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.70**	<0.02	<0.02	**0.08**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.09**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.02**
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW226_210610	0089_MW228_210610 extra for qc	0089_MW202_210610	0089_MW158_210610 extra for qc	0089_MW161_210610 extra for qc
				Sampling date / time	10-Jun-2021 08:30	10-Jun-2021 09:56	10-Jun-2021 12:23	10-Jun-2021 13:35	10-Jun-2021 13:38
					EP2106588-001	EP2106588-002	EP2106588-003	EP2106588-004	EP2106588-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**11.6**	**0.07**	<0.01	**7.68**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.07**	<0.01	**6.80**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**11.6**	**0.07**	<0.01	**7.50**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**110**	**109**	**104**	**106**	**104**
13C8-PFOA	----	0.02	%		**98.8**	**99.1**	**95.9**	**98.0**	**100**

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW166_210610	0089_MW171_210610	0089_QC301_210610 extra for qc	0089_QC401_210610	0089_QC302_210610
				Sampling date / time	10-Jun-2021 13:40	10-Jun-2021 14:28	10-Jun-2021 15:11	10-Jun-2021 15:14	10-Jun-2021 15:14
					EP2106588-006	EP2106588-007	EP2106588-008	EP2106588-009	EP2106588-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.99**	**7.83**	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**2990**	**10200**	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**66**	**13**	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**515**	**429**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**515**	**429**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**212**	**606**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1150**	**4520**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**153**	**219**	----	----	----
Magnesium	7439-95-4	1	mg/L		**142**	**427**	----	----	----
Sodium	7440-23-5	1	mg/L		**686**	**2830**	----	----	----
Potassium	7440-09-7	1	mg/L		**53**	**118**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**47.1**	**149**	----	----	----
ø Total Cations	----	0.01	meq/L		**50.5**	**172**	----	----	----
ø Ionic Balance	----	0.01	%		**3.45**	**7.32**	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		**9**	**5**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.04**	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.10**	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**2.27**	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.49**	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW166_210610	0089_MW171_210610	0089_QC301_210610 extra for qc	0089_QC401_210610	0089_QC302_210610
				Sampling date / time	10-Jun-2021 13:40	10-Jun-2021 14:28	10-Jun-2021 15:11	10-Jun-2021 15:14	10-Jun-2021 15:14
					EP2106588-006	EP2106588-007	EP2106588-008	EP2106588-009	EP2106588-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**8.51**	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.1**	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.34**	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.37**	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.17**	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.16**	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.02**	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW166_210610	0089_MW171_210610	0089_QC301_210610 extra for qc	0089_QC401_210610	0089_QC302_210610
				Sampling date / time	10-Jun-2021 13:40	10-Jun-2021 14:28	10-Jun-2021 15:11	10-Jun-2021 15:14	10-Jun-2021 15:14
					EP2106588-006	EP2106588-007	EP2106588-008	EP2106588-009	EP2106588-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**12.6**	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**10.8**	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**12.0**	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**107**	**106**	**107**	**117**	**102**
13C8-PFOA	----	0.02	%		**99.2**	**97.7**	**99.6**	**103**	**95.5**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0089_QC402_210610	0089_QC303_210610	0089_QC403_210610	0089_MW227_210610	----
			Sampling date / time	10-Jun-2021 15:15	10-Jun-2021 15:16	10-Jun-2021 15:16	10-Jun-2021 15:36	----
Compound	CAS Number	LOR	Unit	EP2106588-011	EP2106588-012	EP2106588-013	EP2106588-014	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	----	----	8.02	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	3340	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	----	----	----	60	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	315	----
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	315	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	193	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	----	----	1410	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	----	----	132	----
Magnesium	7439-95-4	1	mg/L	----	----	----	99	----
Sodium	7440-23-5	1	mg/L	----	----	----	883	----
Potassium	7440-09-7	1	mg/L	----	----	----	53	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	----	----	----	50.1	----
ø Total Cations	----	0.01	meq/L	----	----	----	54.5	----
ø Ionic Balance	----	0.01	%	----	----	----	4.22	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	----	----	----	18	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_QC402_210610	0089_QC303_210610	0089_QC403_210610	0089_MW227_210610	----
				Sampling date / time	10-Jun-2021 15:15	10-Jun-2021 15:16	10-Jun-2021 15:16	10-Jun-2021 15:36	----
Compound	CAS Number	LOR	Unit		EP2106588-011	EP2106588-012	EP2106588-013	EP2106588-014	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_QC402_210610	0089_QC303_210610	0089_QC403_210610	0089_MW227_210610	----
				Sampling date / time	10-Jun-2021 15:15	10-Jun-2021 15:16	10-Jun-2021 15:16	10-Jun-2021 15:36	----
Compound	CAS Number	LOR	Unit		EP2106588-011	EP2106588-012	EP2106588-013	EP2106588-014	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**116**	**111**	**112**	----
13C8-PFOA	----	0.02	%		**101**	**102**	**101**	**99.7**	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106588**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23954	Issue Date	: 22-Jun-2021
Sampler	: [redacted], [redacted]		
Site	: Ah DEF19009/Stirling GW		
Quote number	: SY/139/19		
No. of samples received	: 14		
No. of samples analysed	: 14		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
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General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3747185)									
EP2106649-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.48	6.53	0.8	0% - 20%
EP2106585-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.12	8.11	0.1	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3740698)									
EP2106579-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	819	788	3.9	0% - 20%
EP2106579-009	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2210	2180	1.7	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3740699)									
EP2106579-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	267	273	2.0	0% - 20%
EP2106588-002	0089_MW228_210610 extra for qc	EA025H: Suspended Solids (SS)	----	5	mg/L	393	393	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3747186)									
EP2106649-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	32	31	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	32	31	0.0	0% - 20%
EP2106585-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	171	178	4.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	171	178	4.1	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734688)									
EP2106580-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	17	16	0.0	0% - 50%
EP2106588-005	0089_MW161_210610 extra for qc	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	156	155	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3734689)									
EP2106580-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	36	36	0.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 3734689) - continued									
EP2106588-005	0089_MW161_210610 extra for qc	ED045G: Chloride	16887-00-6	1	mg/L	792	806	1.7	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3739931)									
EP2106582-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	483	468	3.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1570	1520	3.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12000	11600	3.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	654	632	3.5	0% - 20%
EP2106588-006	0089_MW166_210610	ED093F: Calcium	7440-70-2	1	mg/L	153	158	3.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	142	149	4.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	686	728	5.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	53	56	6.2	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 3736973)									
EP2106580-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	36	35	3.1	No Limit
EP2106582-006	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	6	26.4	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3737077)									
EP2106588-006	0089_MW166_210610	EP005: Total Organic Carbon	----	1	mg/L	9	10	13.8	No Limit
EP2106590-008	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	41	39	5.3	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3746244)									
EP2106582-008	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2106588-005	0089_MW161_210610 extra for qc	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	6.04	6.40	5.9	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.05	0.04	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.06	0.06	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.76	0.76	0.0	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.10	0.12	17.4	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3746244)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3746244) - continued									
EP2106582-008	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2106588-005	0089_MW161_210610 extra for qc	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.09	0.09	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.27	0.26	0.0	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.21	0.21	0.0	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.08	0.08	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3746244)									
EP2106582-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3746244) - continued									
EP2106582-008	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106588-005	0089_MW161_210610 extra for qc	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3746244)									
EP2106582-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3746244) - continued									
EP2106582-008	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2106588-005	0089_MW161_210610 extra for qc	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3746244)									
EP2106582-008	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2106588-005	0089_MW161_210610 extra for qc	EP231X: Sum of PFAS	----	0.01	µg/L	7.68	8.04	4.6	0% - 20%
EP231P: PFAS Sums (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3747185)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98.5	102
				----	7 pH Unit	100	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3740698)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	104	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3740699)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	97.9	89.1	120
				<5	1000 mg/L	100	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3747186)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	90.8	81.2	126
				<1	200 mg/L	94.5	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734688)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	87.7	113
				<1	500 mg/L	101	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3734689)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	104	87.9	114
				<1	1000 mg/L	99.9	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3739931)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.3	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.4	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	90.5	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3736973)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	98.0	87.2	116
				<1	100 mg/L	103	87.2	116
EP005: Total Organic Carbon (TOC) (QCLot: 3737077)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	99.1	87.2	116
				<1	100 mg/L	104	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746244)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746244) - continued								
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	116	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	113	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	111	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	125	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746307)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	123	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	87.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	119	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	128	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746244)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	102	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	122	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	120	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	126	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	125	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	120	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	125	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	100	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746307)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	128	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	116	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	115	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	114	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	97.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	117	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	100	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746244)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	96.2	67.0	137

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746244) - continued								
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	124	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	114	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	115	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	120	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	110	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746307)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	97.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	93.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	115	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	123	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	122	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746244)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	114	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	120	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	122	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	121	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746307)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	107	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	128	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	111	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	124	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report		
Spike	SpikeRecovery(%)	Acceptable Limits (%)

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734688)							
EP2106580-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	97.1	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3734689)							
EP2106580-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	100	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3736973)							
EP2106580-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	102	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3737077)							
EP2106588-007	0089_MW171_210610	EP005: Total Organic Carbon	----	100 mg/L	101	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746244)							
EP2106588-004	0089_MW158_210610 extra for qc	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	112	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	123	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	119	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	117	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	115	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	125	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	114	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	120	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	111	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	114	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	128	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	128	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746244)							
EP2106588-004	0089_MW158_210610 extra for qc	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	108	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	125	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	123	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	126	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	129	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	122	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	120	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	122	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	124	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	102	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	110	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	106	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	120	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	123	72.0	129

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746307) - continued							
EP2106582-004	Anonymous	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	118	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	127	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	130	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	127	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	122	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	108	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	98.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	85.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746244)							
EP2106588-004	0089_MW158_210610 extra for qc	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	95.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	96.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	103	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	118	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	112	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	118	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	123	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	119	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	115	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	125	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	111	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	114	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	121	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	113	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746244)							
EP2106588-004	0089_MW158_210610 extra for qc	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	117	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	125	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	128	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	128	71.4	144

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	122	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	106	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	115	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	105	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106588**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Site	: Ah DEF19009/Stirling GW	Issue Date	: 22-Jun-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 14
Order number	: DEF19009/730	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_MW227_210610	----	----	----	21-Jun-2021	10-Jun-2021	**11**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	3	38	7.89	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_MW227_210610	**10-Jun-2021**	**----**	----	----	**21-Jun-2021**	10-Jun-2021	×
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_MW227_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_MW227_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_MW227_210610	**10-Jun-2021**	**----**	----	----	**21-Jun-2021**	24-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_MW227_210610	**10-Jun-2021**	**----**	----	----	**22-Jun-2021**	08-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_MW227_210610	**10-Jun-2021**	**----**	----	----	**22-Jun-2021**	08-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_MW227_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_MW227_210610	**10-Jun-2021**	**----**	----	----	**15-Jun-2021**	08-Jul-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_QC301_210610 - extra for qc, 0089_QC401_210610, 0089_QC302_210610, 0089_QC402_210610, 0089_QC303_210610, 0089_QC403_210610, 0089_MW227_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_QC301_210610 - extra for qc, 0089_QC401_210610, 0089_QC302_210610, 0089_QC402_210610, 0089_QC303_210610, 0089_QC403_210610, 0089_MW227_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_QC301_210610 - extra for qc, 0089_QC401_210610, 0089_QC302_210610, 0089_QC402_210610, 0089_QC303_210610, 0089_QC403_210610, 0089_MW227_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW226_210610, 0089_MW228_210610 - extra for qc, 0089_MW202_210610, 0089_MW158_210610 - extra for qc, 0089_MW161_210610 - extra for qc, 0089_MW166_210610, 0089_MW171_210610, 0089_QC301_210610 - extra for qc, 0089_QC401_210610, 0089_QC302_210610, 0089_QC402_210610, 0089_QC303_210610, 0089_QC403_210610, 0089_MW227_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0089_MW226_210610,	0089_MW228_210610 - extra for qc,	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
0089_MW202_210610,	0089_MW158_210610 - extra for qc,							
0089_MW161_210610 - extra for qc,	0089_MW166_210610,							
0089_MW171_210610,	0089_QC301_210610 - extra for qc,							
0089_QC401_210610,	0089_QC302_210610,							
0089_QC402_210610,	0089_QC303_210610,							
0089_QC403_210610,	0089_MW227_210610							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	38	**7.89**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	**5.56**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106588**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23954	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Ah DEF19009/Stirling GW		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 11-Jun-2021 13:45	Issue Date	: 14-Jun-2021
Client Requested Due Date	: 22-Jun-2021	Scheduled Reporting Date	: **22-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.8 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 14 / 14

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2106588-002 : 10-Jun-2021 09:56 : 0089_MW228_210610 - extra for qc
EP2106588-004 : 10-Jun-2021 13:35 : 0089_MW158_210610 - extra for qc
EP2106588-005 : 10-Jun-2021 13:38 : 0089_MW161_210610 - extra for qc
EP2106588-008 : 10-Jun-2021 15:11 : 0089_QC301_210610 - extra for qc

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106588-001	10-Jun-2021 08:30	0089_MW226_210610	✓	✓	✓	✓	✓	✓	✓
EP2106588-002	10-Jun-2021 09:56	0089_MW228_210610 e...	✓	✓	✓	✓	✓	✓	✓
EP2106588-003	10-Jun-2021 12:23	0089_MW202_210610	✓	✓	✓	✓	✓	✓	✓
EP2106588-004	10-Jun-2021 13:35	0089_MW158_210610 e...	✓	✓	✓	✓	✓	✓	✓
EP2106588-005	10-Jun-2021 13:38	0089_MW161_210610 e...	✓	✓	✓	✓	✓	✓	✓
EP2106588-006	10-Jun-2021 13:40	0089_MW166_210610	✓	✓	✓	✓	✓	✓	✓
EP2106588-007	10-Jun-2021 14:28	0089_MW171_210610	✓	✓	✓	✓	✓	✓	✓
EP2106588-014	10-Jun-2021 15:36	0089_MW227_210610	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106588-001	10-Jun-2021 08:30	0089_MW226_210610	✓
EP2106588-002	10-Jun-2021 09:56	0089_MW228_210610 e...	✓
EP2106588-003	10-Jun-2021 12:23	0089_MW202_210610	✓
EP2106588-004	10-Jun-2021 13:35	0089_MW158_210610 e...	✓
EP2106588-005	10-Jun-2021 13:38	0089_MW161_210610 e...	✓
EP2106588-006	10-Jun-2021 13:40	0089_MW166_210610	✓
EP2106588-007	10-Jun-2021 14:28	0089_MW171_210610	✓
EP2106588-008	10-Jun-2021 15:11	0089_QC301_210610 e...	✓
EP2106588-009	10-Jun-2021 15:14	0089_QC401_210610	✓
EP2106588-010	10-Jun-2021 15:14	0089_QC302_210610	✓
EP2106588-011	10-Jun-2021 15:15	0089_QC402_210610	✓

			WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106588-012	10-Jun-2021 15:16	0089_QC303_210610	✓
EP2106588-013	10-Jun-2021 15:16	0089_QC403_210610	✓
EP2106588-014	10-Jun-2021 15:36	0089_MW227_210610	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
0089_MW158_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_MW161_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_MW166_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_MW171_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_MW202_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_MW226_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_MW227_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_MW228_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

(ALS) COC#: **23954** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW226		10/06/2021 08:30 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
002	0089_MW228	extra for qc	10/06/2021 09:56 AM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8		X		
003	0089_MW202		10/06/2021 12:23 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
004	0089_MW158	extra for qc	10/06/2021 01:35 PM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8		X		
005	0089_MW161	extra for qc	10/06/2021 01:38 PM	Water	ALS: 7 Non ALS: 0	No	Partial 7/8		X		
006	0089_MW166		10/06/2021 01:40 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
007	0089_MW171		10/06/2021 02:28 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		
008	0089_QC301	extra for qc	10/06/2021 03:11 PM	Water	ALS: 4 Non ALS: 0	No		X			
009	0089_QC401		10/06/2021 03:14 PM	Water	ALS: 2 Non ALS: 0	No		X			

Environmental Division
Perth
Work Order Reference
EP2106588

Telephone : -- 61-8-9406 1301

CHAIN OF CUSTODY

(ALS) *COC#:* **23954** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_QC302		10/06/2021 03:14 PM	Water	ALS: 2 Non ALS: 0	No		X			
011	0089_QC402		10/06/2021 03:15 PM	Water	ALS: 2 Non ALS: 0	No		X			
012	0089_QC303		10/06/2021 03:16 PM	Water	ALS: 2 Non ALS: 0	No		X			
013	0089_QC403		10/06/2021 03:16 PM	Water	ALS: 2 Non ALS: 0	No		X			
014	0089_MW227		10/06/2021 03:36 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8		X		

CHAIN OF CUSTODY

ALS COC#: 23954 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW226	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW228	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW202	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW158	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW161	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 23954 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_MW166	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW171	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
014	0089_MW227	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **23954** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW226	Clear Plastic Bottle - Natural	250 mL	00070220025219	Green	No	
001	0089_MW226	Clear Plastic Bottle - Natural	250 mL	00070220025277	Green	No	
001	0089_MW226	HDPE (no PTFE)	20 mL	00350019151042	Grey	No	
001	0089_MW226	HDPE (no PTFE)	20 mL	00350019151063	Grey	No	
001	0089_MW226	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016876	Purple	No	
002	0089_MW228	Clear Plastic Bottle - Natural	250 mL	00070220025374	Green	No	
002	0089_MW228	Clear Plastic Bottle - Natural	250 mL	00070220025392	Green	No	
002	0089_MW228	HDPE (no PTFE)	20 mL	00350019150976	Grey	No	
002	0089_MW228	HDPE (no PTFE)	20 mL	00350019151205	Grey	No	
002	0089_MW228	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016773	Purple	No	
002	0089_MW228	HDPE (no PTFE)	20 mL	00350019130819	Grey	No	
002	0089_MW228	HDPE (no PTFE)	20 mL	00350019151577	Grey	No	
003	0089_MW202	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016616	Purple	No	
003	0089_MW202	HDPE (no PTFE)	20 mL	0035001915033	Grey	No	
003	0089_MW202	Clear Plastic Bottle - Natural	250 mL	00070220025225	Green	No	
003	0089_MW202	Clear Plastic Bottle - Natural	250 mL	00070220025183	Green	No	
003	0089_MW202	HDPE (no PTFE)	20 mL	00350019151073	Grey	No	
004	0089_MW158	Clear Plastic Bottle - Natural	250 mL	00070220025182	Green	No	
004	0089_MW158	Clear Plastic Bottle - Natural	250 mL	00070220025186	Green	No	
004	0089_MW158	HDPE (no PTFE)	20 mL	00350019151003	Grey	No	
004	0089_MW158	HDPE (no PTFE)	20 mL	00350019151219	Grey	No	
004	0089_MW158	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016749	Purple	No	
004	0089_MW158	HDPE (no PTFE)	20 mL	00350019130886	Grey	No	
004	0089_MW158	HDPE (no PTFE)	20 mL	00350019164175	Grey	No	
005	0089_MW161	Clear Plastic Bottle - Natural	250 mL	00070220025324	Green	No	
005	0089_MW161	Clear Plastic Bottle - Natural	250 mL	00070220025327	Green	No	

CHAIN OF CUSTODY

COC#: **23954** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

005	0089_MW161	HDPE (no PTFE)	20 mL	00350019150906	Grey	No	
005	0089_MW161	HDPE (no PTFE)	20 mL	00350019150969	Grey	No	
005	0089_MW161	Amber TOC Vial - Sulfuric Acid	40 mL	00181020004323	Purple	No	
005	0089_MW161	HDPE (no PTFE)	20 mL	00350019126933	Grey	No	
005	0089_MW161	HDPE (no PTFE)	20 mL	00350019163917	Grey	No	
006	0089_MW166	Clear Plastic Bottle - Natural	250 mL	00070220025429	Green	No	
006	0089_MW166	Clear Plastic Bottle - Natural	250 mL	00070220025385	Green	No	
006	0089_MW166	HDPE (no PTFE)	20 mL	00350019150995	Grey	No	
006	0089_MW166	HDPE (no PTFE)	20 mL	00350019150957	Grey	No	
006	0089_MW166	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016843	Purple	No	
007	0089_MW171	HDPE (no PTFE)	20 mL	00350019150994	Grey	No	
007	0089_MW171	HDPE (no PTFE)	20 mL	00350019151237	Grey	No	
007	0089_MW171	Clear Plastic Bottle - Natural	250 mL	00070220025355	Green	No	
007	0089_MW171	Clear Plastic Bottle - Natural	250 mL	00070220025319	Green	No	
007	0089_MW171	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016712	Purple	No	
008	0089_QC301	HDPE (no PTFE)	20 mL	00350019130742	Grey	No	
008	0089_QC301	HDPE (no PTFE)	20 mL	00350019102499	Grey	No	
008	0089_QC301	HDPE (no PTFE)	20 mL	00350019163941	Grey	No	
008	0089_QC301	HDPE (no PTFE)	20 mL	00350019126964	Grey	No	
009	0089_QC401	HDPE (no PTFE)	20 mL	00350019152413	Grey	No	
009	0089_QC401	HDPE (no PTFE)	20 mL	00350019126734	Grey	No	
010	0089_QC302	HDPE (no PTFE)	20 mL	00350019164154	Grey	No	
010	0089_QC302	HDPE (no PTFE)	20 mL	00350019164258	Grey	No	
011	0089_QC402	HDPE (no PTFE)	20 mL	00350019130919	Grey	No	
011	0089_QC402	HDPE (no PTFE)	20 mL	00350019130858	Grey	No	
012	0089_QC303	HDPE (no PTFE)	20 mL	00350019164265	Grey	No	
012	0089_QC303	HDPE (no PTFE)	20 mL	00350019126952	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 23954 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO:

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

013	0089_QC403	HDPE (no PTFE)	20 mL	00350019163912	Grey	No	
013	0089_QC403	HDPE (no PTFE)	20 mL	00350019130773	Grey	No	
014	0089_MW227	HDPE (no PTFE)	20 mL	00350019150852	Grey	No	
014	0089_MW227	Clear Plastic Bottle - Natural	250 mL	00070220025401	Green	No	
014	0089_MW227	Clear Plastic Bottle - Natural	250 mL	00070220025168	Green	No	
014	0089_MW227	HDPE (no PTFE)	20 mL	00350019150793	Grey	No	
014	0089_MW227	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016849	Purple	No	

Total Bottle Count: ALS: 60, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106589**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021 13:45
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23955	Issue Date	: 23-Jun-2021 12:20
Sampler	: [redacted], [redacted]		
Site	: Ah DEF19009/Stirling SED		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD409_210610	0089_SD405_210610	0089_QC116_210610	0089_SD407_210610	----
			Sampling date / time	10-Jun-2021 09:20	10-Jun-2021 10:43	10-Jun-2021 10:44	10-Jun-2021 16:06	----
Compound	CAS Number	LOR	Unit	EP2106589-001	EP2106589-002	EP2106589-003	EP2106589-004	--------
				Result	Result	Result	Result	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**8.9**	**9.3**	**9.3**	**9.1**	**----**
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**3630**	**528**	**545**	**3720**	**----**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**26.4**	**18.1**	**18.9**	**31.2**	**----**
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**11.0**	**----**	**----**	**----**	**----**
Exchangeable Magnesium	----	0.1	meq/100g	**3.5**	**----**	**----**	**----**	**----**
Exchangeable Potassium	----	0.1	meq/100g	**0.3**	**----**	**----**	**----**	**----**
Exchangeable Sodium	----	0.1	meq/100g	**9.6**	**----**	**----**	**----**	**----**
Cation Exchange Capacity	----	0.1	meq/100g	**24.4**	**----**	**----**	**----**	**----**
Exchangeable Sodium Percent	----	0.1	%	**39.4**	**----**	**----**	**----**	**----**
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**----**	**3.4**	**3.0**	**5.9**	**----**
Exchangeable Magnesium	----	0.1	meq/100g	**----**	**0.3**	**0.3**	**0.7**	**----**
Exchangeable Potassium	----	0.1	meq/100g	**----**	<0.1	<0.1	<0.1	**----**
Exchangeable Sodium	----	0.1	meq/100g	**----**	<0.1	<0.1	**0.1**	**----**
Cation Exchange Capacity	----	0.1	meq/100g	**----**	**3.8**	**3.4**	**6.7**	**----**
Exchangeable Sodium Percent	----	0.1	%	**----**	**1.9**	**1.8**	**2.0**	**----**
EP004: Organic Matter								
Organic Matter	----	0.5	%	**1.2**	**0.8**	**0.5**	**1.2**	**----**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0011**	**0.0003**	**0.0006**	<0.0002	**----**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD409_210610	0089_SD405_210610	0089_QC116_210610	0089_SD407_210610	----
				Sampling date / time	10-Jun-2021 09:20	10-Jun-2021 10:43	10-Jun-2021 10:44	10-Jun-2021 16:06	----
Compound	CAS Number	LOR	Unit		EP2106589-001	EP2106589-002	EP2106589-003	EP2106589-004	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD409_210610	0089_SD405_210610	0089_QC116_210610	0089_SD407_210610	----
				Sampling date / time	10-Jun-2021 09:20	10-Jun-2021 10:43	10-Jun-2021 10:44	10-Jun-2021 16:06	----
Compound	CAS Number	LOR	Unit		EP2106589-001	EP2106589-002	EP2106589-003	EP2106589-004	--------
					Result	Result	Result	Result	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0011**	**0.0003**	**0.0006**	<0.0002	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0011**	**0.0003**	**0.0006**	<0.0002	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0011**	**0.0003**	**0.0006**	<0.0002	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**93.0**	**83.5**	**82.0**	**83.0**	----
13C8-PFOA	----	0.0002	%		**110**	**118**	**110**	**115**	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106589**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23955	Issue Date	: 23-Jun-2021
Sampler	: [redacted], [redacted]		
Site	: Ah DEF19009/Stirling SED		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3738188)									
EP2106581-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.5	8.7	2.4	0% - 20%
EP2106589-003	0089_QC116_210610	EA002: pH Value	----	0.1	pH Unit	9.3	9.3	0.0	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3738187)									
EP2106581-001	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	114	114	0.0	0% - 20%
EP2106589-003	0089_QC116_210610	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	545	551	1.1	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3735325)									
EP2106581-001	Anonymous	EA055: Moisture Content	----	0.1	%	25.7	25.7	0.0	0% - 20%
EP2106589-003	0089_QC116_210610	EA055: Moisture Content	----	0.1	%	18.9	18.6	1.5	0% - 20%
ED007: Exchangeable Cations (QC Lot: 3741015)									
EP2106581-001	Anonymous	ED007: Exchangeable Sodium Percent	----	0.1	%	3.3	3.6	7.8	0% - 20%
		ED007: Exchangeable Calcium	----	0.1	meq/100g	9.1	8.3	8.7	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	0.7	0.7	0.0	No Limit
		ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.3	0.3	0.0	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	10.2	9.4	8.5	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3739367)									
EP2106581-002	Anonymous	ED008: Exchangeable Sodium Percent	----	0.1	%	2.9	2.6	9.0	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	2.9	3.3	11.2	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.4	0.0	No Limit
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.1	0.0	No Limit
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	3.4	3.8	11.1	0% - 20%
EP004: Organic Matter (QC Lot: 3735327)									
EP2106581-001	Anonymous	EP004: Organic Matter	----	0.5	%	2.3	2.4	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP004: Organic Matter (QC Lot: 3735327) - continued									
EP2106589-004	0089_SD407_210610	EP004: Organic Matter	----	0.5	%	1.2	1.2	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3747827)									
EP2106581-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0028	0.0040	34.6	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2106589-004	0089_SD407_210610	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3747827)									
EP2106581-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2106589-004	0089_SD407_210610	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3747827)									
EP2106581-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3747827) - continued									
EP2106581-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106589-004	0089_SD407_210610	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3747827)									
EP2106581-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2106589-004	0089_SD407_210610	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3747827) - continued									
EP2106589-004	0089_SD407_210610	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3738188)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	99.5	70.0	130
				----	7 pH Unit	99.7	70.0	130
EA010: Conductivity (1:5) (QCLot: 3738187)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	147 µS/cm	100	93.6	106
ED007: Exchangeable Cations (QCLot: 3741015)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	21.6 meq/100g	91.8	82.9	117
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.76 meq/100g	94.3	78.4	119
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	1 meq/100g	109	87.9	129
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.9 meq/100g	105	92.9	132
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	25.3 meq/100g	92.9	84.7	117
ED007: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Exchangeable Cations (QCLot: 3739367)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	22.1 meq/100g	97.5	78.7	111
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.56 meq/100g	92.6	77.6	111
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.91 meq/100g	99.6	86.9	116
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.38 meq/100g	100	72.3	129
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	24.95 meq/100g	97.3	79.9	110
EP004: Organic Matter (QCLot: 3735327)								
EP004: Organic Matter	----	0.5	%	<0.5	2.3 %	93.0	70.0	120
				<0.5	85 %	95.8	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3747827)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3747827)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	116	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.6	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	69.0	133

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3747827) - continued								
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3747827)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	115	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	105	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.5	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3747827)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	90.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	109	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	93.6	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.2	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3747827)							
EP2106581-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	101	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	96.4	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	97.2	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	94.0	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	132	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	116	59.0	134

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3747827)							
EP2106581-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	101	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	90.8	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	94.8	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	101	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	103	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	106	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	110	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	123	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	96.4	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	102	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	97.3	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3747827)							
EP2106581-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	96.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	121	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	101	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	105	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	85.6	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	95.6	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	93.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3747827)							
EP2106581-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	96.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	92.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	78.0	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	77.6	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106589**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Site	: Ah DEF19009/Stirling SED	Issue Date	: 23-Jun-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 4
Order number	: DEF19009/730	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
0089_SD409_210610, 0089_SD405_210610, 0089_QC116_210610, 0089_SD407_210610	**10-Jun-2021**	**16-Jun-2021**	17-Jun-2021	✓	**16-Jun-2021**	16-Jun-2021	✓
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
0089_SD409_210610, 0089_SD405_210610, 0089_QC116_210610, 0089_SD407_210610	**10-Jun-2021**	**16-Jun-2021**	17-Jun-2021	✓	**16-Jun-2021**	14-Jul-2021	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
0089_SD409_210610, 0089_SD405_210610, 0089_QC116_210610, 0089_SD407_210610	**10-Jun-2021**	**----**	----	----	**15-Jun-2021**	24-Jun-2021	✓
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED007)							
0089_SD409_210610	**10-Jun-2021**	**17-Jun-2021**	08-Jul-2021	✓	**17-Jun-2021**	08-Jul-2021	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
0089_SD405_210610, 0089_QC116_210610, 0089_SD407_210610	**10-Jun-2021**	**17-Jun-2021**	08-Jul-2021	✓	**17-Jun-2021**	08-Jul-2021	✓
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
0089_SD409_210610, 0089_SD405_210610, 0089_QC116_210610, 0089_SD407_210610	**10-Jun-2021**	**21-Jun-2021**	08-Jul-2021	✓	**21-Jun-2021**	08-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD409_210610, 0089_SD405_210610, 0089_QC116_210610, 0089_SD407_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	31-Jul-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD409_210610, 0089_SD405_210610, 0089_QC116_210610, 0089_SD407_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	31-Jul-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD409_210610, 0089_SD405_210610, 0089_QC116_210610, 0089_SD407_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	31-Jul-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD409_210610, 0089_SD405_210610, 0089_QC116_210610, 0089_SD407_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	31-Jul-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD409_210610, 0089_SD405_210610, 0089_QC116_210610, 0089_SD407_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**22-Jun-2021**	31-Jul-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106589**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23955	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Ah DEF19009/Stirling SED		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 11-Jun-2021 13:45	Issue Date	: 14-Jun-2021
Client Requested Due Date	: 22-Jun-2021	Scheduled Reporting Date	: **22-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.8 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - AG-1 Agricultural Soil Suite 1	SOIL - EA055-103 Moisture Content	SOIL - EP004 Organic Matter in Soil (Walkley Black)	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2106589-001	10-Jun-2021 09:20	0089_SD409_210610	✓	✓	✓	✓
EP2106589-002	10-Jun-2021 10:43	0089_SD405_210610	✓	✓	✓	✓
EP2106589-003	10-Jun-2021 10:44	0089_QC116_210610	✓	✓	✓	✓
EP2106589-004	10-Jun-2021 16:06	0089_SD407_210610	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

CHAIN OF CUSTODY

ALS COC#: 23955 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD409		10/06/2021 09:20 AM	Soil	ALS: 2 Non ALS: 0	No	X	X		
002	0089_SD405		10/06/2021 10:43 AM	Soil	ALS: 2 Non ALS: 0	No		X		
003	0089_QC116		10/06/2021 10:44 AM	Soil	ALS: 2 Non ALS: 0	No		X		
004	0089_SD407		10/06/2021 04:06 PM	Soil	ALS: 2 Non ALS: 0	No		X		

Environmental Division
Perth
Work Order Reference
EP2106589

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

ALS COC#: 23955 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD409	Soil Glass Jar - Unpreserved	150 mL	00260121045272	Orange	No	
001	0089_SD409	HDPE Soil Jar	200 mL	00620719062515	Grey	No	
002	0089_SD405	HDPE Soil Jar	200 mL	00620719063233	Grey	No	
002	0089_SD405	Soil Glass Jar - Unpreserved	150 mL	00260121045242	Orange	No	
003	0089_QC116	HDPE Soil Jar	200 mL	00620719062555	Grey	No	
003	0089_QC116	Soil Glass Jar - Unpreserved	150 mL	00260121045289	Orange	No	
004	0089_SD407	Soil Glass Jar - Unpreserved	150 mL	00260121045317	Orange	No	
004	0089_SD407	HDPE Soil Jar	200 mL	00620719062509	Grey	No	

Total Bottle Count: ALS: 8, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2106590**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021 13:45
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23956	Issue Date	: 23-Jun-2021 14:50
Sampler	: [redacted], [redacted]		
Site	: Ah DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0089_PW409_210610	0089_pw405_210610	0089_QC115_210610	0089_SW372_210610	0089_PW407_210610
			Sampling date / time	10-Jun-2021 09:18	10-Jun-2021 09:58	10-Jun-2021 10:01	10-Jun-2021 11:50	10-Jun-2021 15:30
Compound	CAS Number	LOR	Unit	EP2106590-003	EP2106590-004	EP2106590-005	EP2106590-007	EP2106590-009
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.81	7.91	7.94	7.69	7.99
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	40800	9310	10400	42300	42700
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	298	33	65	765	326
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	113	206	190	162	189
Total Alkalinity as CaCO3	----	1	mg/L	113	206	190	162	189
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2580	707	750	2490	2310
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18700	5130	5440	18100	17200
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	475	254	246	496	445
Magnesium	7439-95-4	1	mg/L	1480	378	366	1530	1370
Sodium	7440-23-5	1	mg/L	11400	2580	2500	11700	10600
Potassium	7440-09-7	1	mg/L	642	135	131	675	597
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	583	164	173	566	537
ø Total Cations	----	0.01	meq/L	658	159	154	677	611
ø Ionic Balance	----	0.01	%	5.99	1.26	5.61	8.95	6.46
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	16	11	8	21	14
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.03	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW409_210610	0089_pw405_210610	0089_QC115_210610	0089_SW372_210610	0089_PW407_210610
				Sampling date / time	10-Jun-2021 09:18	10-Jun-2021 09:58	10-Jun-2021 10:01	10-Jun-2021 11:50	10-Jun-2021 15:30
Compound	CAS Number	LOR	Unit		EP2106590-003	EP2106590-004	EP2106590-005	EP2106590-007	EP2106590-009
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.01**	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.02**
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.05**	**0.05**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.06**	**0.07**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW409_210610	0089_pw405_210610	0089_QC115_210610	0089_SW372_210610	0089_PW407_210610
				Sampling date / time	10-Jun-2021 09:18	10-Jun-2021 09:58	10-Jun-2021 10:01	10-Jun-2021 11:50	10-Jun-2021 15:30
Compound	CAS Number	LOR	Unit		EP2106590-003	EP2106590-004	EP2106590-005	EP2106590-007	EP2106590-009
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.01**	**0.14**	**0.12**	<0.01	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.01**	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.01**	**0.11**	**0.12**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**112**	**108**	**109**	**103**	**105**
13C8-PFOA	----	0.02	%		**102**	**96.3**	**96.5**	**97.7**	**94.4**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW410_210610	0089_QC114_210610	0089_SW406_210610	0089_SW371_210610	0089_SW408_210610
				Sampling date / time	10-Jun-2021 08:44	10-Jun-2021 08:46	10-Jun-2021 10:05	10-Jun-2021 12:34	10-Jun-2021 15:34
Compound	CAS Number	LOR	Unit		EP2106590-001	EP2106590-002	EP2106590-006	EP2106590-008	EP2106590-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.91	7.94	7.94	7.63	7.85
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		38700	37300	42400	40300	39500
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		80	40	69	821	726
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		110	114	112	129	135
Total Alkalinity as CaCO3	----	1	mg/L		110	114	112	129	135
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2620	2590	2740	2670	2560
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		18500	18400	18600	18000	18500
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		488	469	494	472	468
Magnesium	7439-95-4	1	mg/L		1520	1460	1560	1460	1470
Sodium	7440-23-5	1	mg/L		11700	11200	12000	11200	11300
Potassium	7440-09-7	1	mg/L		660	635	680	636	638
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		579	575	584	566	578
ø Total Cations	----	0.01	meq/L		675	647	692	647	652
ø Ionic Balance	----	0.01	%		7.71	5.87	8.50	6.70	6.04
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L		3	3	7	41	5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW410_210610	0089_QC114_210610	0089_SW406_210610	0089_SW371_210610	0089_SW408_210610
				Sampling date / time	10-Jun-2021 08:44	10-Jun-2021 08:46	10-Jun-2021 10:05	10-Jun-2021 12:34	10-Jun-2021 15:34
Compound	CAS Number	LOR	Unit		EP2106590-001	EP2106590-002	EP2106590-006	EP2106590-008	EP2106590-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW410_210610	0089_QC114_210610	0089_SW406_210610	0089_SW371_210610	0089_SW408_210610
				Sampling date / time	10-Jun-2021 08:44	10-Jun-2021 08:46	10-Jun-2021 10:05	10-Jun-2021 12:34	10-Jun-2021 15:34
Compound	CAS Number	LOR	Unit		EP2106590-001	EP2106590-002	EP2106590-006	EP2106590-008	EP2106590-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**116**	**103**	**106**	**96.8**	**96.8**
13C8-PFOA	----	0.02	%		**100**	**99.2**	**99.3**	**93.9**	**95.1**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2106590**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 15-Jun-2021
C-O-C number	: 23956	Issue Date	: 23-Jun-2021
Sampler	: [redacted], [redacted]		
Site	: Ah DEF19009/Stirling SW/PW		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 10		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3743990)									
EP2106582-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.74	7.75	0.1	0% - 20%
EP2106582-010	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.87	7.85	0.3	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3740709)									
EP2106580-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	324	324	0.3	0% - 20%
EP2106582-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	35200	35000	0.3	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3740710)									
EP2106580-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	86	93	8.4	0% - 50%
EP2106590-002	0089_QC114_210610	EA025H: Suspended Solids (SS)	----	5	mg/L	40	46	12.8	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3743991)									
EP2106590-008	0089_SW371_210610	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	129	129	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	129	129	0.0	0% - 20%
EP2106582-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	120	123	2.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	120	123	2.2	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3734688)									
EP2106580-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	17	16	0.0	0% - 50%
EP2106588-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	156	155	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3739805)									
EP2106783-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	60	60	0.0	0% - 20%
EP2106277-008	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	320	320	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3734689)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 3734689) - continued									
EP2106580-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	36	36	0.0	0% - 20%
EP2106588-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	792	806	1.7	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3739806)									
EP2106783-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	103	102	0.0	0% - 20%
EP2106277-008	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1170	1170	0.3	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3735871)									
EP2106590-001	0089_SW410_210610	ED093F: Calcium	7440-70-2	1	mg/L	488	466	4.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1520	1460	4.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11700	11100	4.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	660	633	4.1	0% - 20%
EP2106690-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	46	47	2.9	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	37	38	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	97	98	1.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3737077)									
EP2106588-006	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	9	10	13.8	No Limit
EP2106590-008	0089_SW371_210610	EP005: Total Organic Carbon	----	1	mg/L	41	39	5.3	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3746307) - continued									
EP2106579-008	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3746307)									
EP2106579-008	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 3743990)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98.5	102
				----	7 pH Unit	99.7	98.5	102
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3740709)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	246 mg/L	105	88.1	114
				<10	1000 mg/L	102	88.1	114
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3740710)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	95 mg/L	96.8	89.1	120
				<5	1000 mg/L	103	89.1	120
ED037P: Alkalinity by PC Titrator (QCLot: 3743991)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	112	81.2	126
				<1	200 mg/L	95.0	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734688)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	87.7	113
				<1	500 mg/L	101	87.7	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3739805)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3734689)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	104	87.9	114
				<1	1000 mg/L	99.9	87.9	114
ED045G: Chloride by Discrete Analyser (QCLot: 3739806)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	104	87.9	114
				<1	1000 mg/L	101	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3735871)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.8	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.4	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.7	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3737077)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP005: Total Organic Carbon (TOC) (QCLot: 3737077) - continued								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	99.1	87.2	116
				<1	100 mg/L	104	87.2	116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746307)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	123	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	87.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	119	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	128	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3747102)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	83.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	112	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	123	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	118	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746307)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	128	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	116	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	115	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	114	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	97.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	117	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	100	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3747102)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	110	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	127	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	120	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	125	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	131	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	97.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	126	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	128	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3747102) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	125	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746307)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	97.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	93.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	115	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	123	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	122	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3747102)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	105	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	123	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	74.5	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	128	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	87.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	132	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746307)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	107	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	128	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	111	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	124	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3747102)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	116	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	125	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	121	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	105	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3734688)							
EP2106580-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	97.1	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3739805)							
EP2106277-008	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	105	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3734689)							
EP2106580-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	100	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3739806)							
EP2106277-008	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	82.7	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3737077)							
EP2106588-007	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	101	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	114	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	120	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	111	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	114	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	128	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	128	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	106	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	120	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	123	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	118	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	127	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	130	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	127	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	122	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	108	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	98.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	85.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	119	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	115	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	125	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	111	66.0	145

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3746307) - continued							
EP2106582-004	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	114	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	121	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	113	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3746307)							
EP2106582-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	122	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	106	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	115	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	105	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2106590**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 11-Jun-2021
Site	: Ah DEF19009/Stirling SW/PW	Issue Date	: 23-Jun-2021
Sampler	: [redacted], [redacted]	No. of samples received	: 10
Order number	: DEF19009/730	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
0089_SW410_210610,	0089_QC114_210610,	----	----	----	18-Jun-2021	10-Jun-2021	**8**
0089_PW409_210610,	0089_pw405_210610,						
0089_QC115_210610,	0089_SW406_210610,						
0089_SW372_210610,	0089_SW371_210610,						
0089_PW407_210610,	0089_SW408_210610						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	34	2.94	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	34	2.94	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
0089_SW410_210610,	0089_QC114_210610,	**10-Jun-2021**	**----**	----	----	**18-Jun-2021**	10-Jun-2021	×
0089_PW409_210610,	0089_pw405_210610,							
0089_QC115_210610,	0089_SW406_210610,							
0089_SW372_210610,	0089_SW371_210610,							
0089_PW407_210610,	0089_SW408_210610							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
0089_SW410_210610, 0089_QC114_210610, 0089_PW409_210610, 0089_pw405_210610, 0089_QC115_210610, 0089_SW406_210610, 0089_SW372_210610, 0089_SW371_210610, 0089_PW407_210610, 0089_SW408_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
0089_SW410_210610, 0089_QC114_210610, 0089_PW409_210610, 0089_pw405_210610, 0089_QC115_210610, 0089_SW406_210610, 0089_SW372_210610, 0089_SW371_210610, 0089_PW407_210610, 0089_SW408_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW410_210610, 0089_QC114_210610, 0089_PW409_210610, 0089_pw405_210610, 0089_QC115_210610, 0089_SW406_210610, 0089_SW372_210610, 0089_SW371_210610, 0089_PW407_210610, 0089_SW408_210610	**10-Jun-2021**	**----**	----	----	**18-Jun-2021**	24-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_SW372_210610, 0089_SW371_210610, 0089_PW407_210610, 0089_SW408_210610	**10-Jun-2021**	**----**	----	----	**18-Jun-2021**	08-Jul-2021	✓
Clear Plastic Bottle - Natural (ED041G)							
0089_SW410_210610, 0089_QC114_210610, 0089_PW409_210610, 0089_pw405_210610, 0089_QC115_210610, 0089_SW406_210610	**10-Jun-2021**	**----**	----	----	**22-Jun-2021**	08-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_SW372_210610, 0089_SW371_210610, 0089_PW407_210610, 0089_SW408_210610	**10-Jun-2021**	**----**	----	----	**18-Jun-2021**	08-Jul-2021	✓
Clear Plastic Bottle - Natural (ED045G)							
0089_SW410_210610, 0089_QC114_210610, 0089_PW409_210610, 0089_pw405_210610, 0089_QC115_210610, 0089_SW406_210610	**10-Jun-2021**	**----**	----	----	**22-Jun-2021**	08-Jul-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW410_210610, 0089_QC114_210610, 0089_PW409_210610, 0089_pw405_210610, 0089_QC115_210610, 0089_SW406_210610, 0089_SW372_210610, 0089_SW371_210610, 0089_PW407_210610, 0089_SW408_210610	**10-Jun-2021**	**----**	----	----	**17-Jun-2021**	17-Jun-2021	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005)							
0089_SW410_210610, 0089_QC114_210610, 0089_PW409_210610, 0089_pw405_210610, 0089_QC115_210610, 0089_SW406_210610, 0089_SW372_210610, 0089_SW371_210610, 0089_PW407_210610, 0089_SW408_210610	**10-Jun-2021**	**----**	----	----	**15-Jun-2021**	08-Jul-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW410_210610, 0089_QC114_210610, 0089_PW409_210610, 0089_pw405_210610, 0089_QC115_210610, 0089_SW406_210610, 0089_SW372_210610, 0089_SW371_210610, 0089_PW407_210610, 0089_SW408_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW410_210610, 0089_QC114_210610, 0089_PW409_210610, 0089_pw405_210610, 0089_QC115_210610, 0089_SW406_210610, 0089_SW372_210610, 0089_SW371_210610, 0089_PW407_210610, 0089_SW408_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW410_210610, 0089_QC114_210610, 0089_PW409_210610, 0089_pw405_210610, 0089_QC115_210610, 0089_SW406_210610, 0089_SW372_210610, 0089_SW371_210610, 0089_PW407_210610, 0089_SW408_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW410_210610, 0089_QC114_210610, 0089_PW409_210610, 0089_pw405_210610, 0089_QC115_210610, 0089_SW406_210610, 0089_SW372_210610, 0089_SW371_210610, 0089_PW407_210610, 0089_SW408_210610	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0089_SW410_210610,	0089_QC114_210610,	**10-Jun-2021**	**21-Jun-2021**	07-Dec-2021	✓	**21-Jun-2021**	07-Dec-2021	✓
0089_PW409_210610,	0089_pw405_210610,							
0089_QC115_210610,	0089_SW406_210610,							
0089_SW372_210610,	0089_SW371_210610,							
0089_PW407_210610,	0089_SW408_210610							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	31	**12.90**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	34	**2.94**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	31	**12.90**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	**10.53**	**10.53**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	**5.26**	**5.26**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	31	**6.45**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	34	**2.94**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2106590**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 23956	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Ah DEF19009/Stirling SW/PW		
Sampler	: [redacted], [redacted]		

Dates

Date Samples Received	: 11-Jun-2021 13:45	Issue Date	: 14-Jun-2021
Client Requested Due Date	: 22-Jun-2021	Scheduled Reporting Date	: **22-Jun-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.8 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 10 / 10

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP005 Total Organic Carbon (TOC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2106590-001	10-Jun-2021 08:44	0089_SW410_210610	✓	✓	✓	✓	✓	✓	✓
EP2106590-002	10-Jun-2021 08:46	0089_QC114_210610	✓	✓	✓	✓	✓	✓	✓
EP2106590-003	10-Jun-2021 09:18	0089_PW409_210610	✓	✓	✓	✓	✓	✓	✓
EP2106590-004	10-Jun-2021 09:58	0089_pw405_210610	✓	✓	✓	✓	✓	✓	✓
EP2106590-005	10-Jun-2021 10:01	0089_QC115_210610	✓	✓	✓	✓	✓	✓	✓
EP2106590-006	10-Jun-2021 10:05	0089_SW406_210610	✓	✓	✓	✓	✓	✓	✓
EP2106590-007	10-Jun-2021 11:50	0089_SW372_210610	✓	✓	✓	✓	✓	✓	✓
EP2106590-008	10-Jun-2021 12:34	0089_SW371_210610	✓	✓	✓	✓	✓	✓	✓
EP2106590-009	10-Jun-2021 15:30	0089_PW407_210610	✓	✓	✓	✓	✓	✓	✓
EP2106590-010	10-Jun-2021 15:34	0089_SW408_210610	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)
EP2106590-001	10-Jun-2021 08:44	0089_SW410_210610	✓
EP2106590-002	10-Jun-2021 08:46	0089_QC114_210610	✓
EP2106590-003	10-Jun-2021 09:18	0089_PW409_210610	✓
EP2106590-004	10-Jun-2021 09:58	0089_pw405_210610	✓
EP2106590-005	10-Jun-2021 10:01	0089_QC115_210610	✓
EP2106590-006	10-Jun-2021 10:05	0089_SW406_210610	✓
EP2106590-007	10-Jun-2021 11:50	0089_SW372_210610	✓
EP2106590-008	10-Jun-2021 12:34	0089_SW371_210610	✓
EP2106590-009	10-Jun-2021 15:30	0089_PW407_210610	✓
EP2106590-010	10-Jun-2021 15:34	0089_SW408_210610	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
0089_pw405_210610	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_PW407_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_PW409_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_QC114_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_QC115_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_SW371_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_SW372_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_SW406_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_SW408_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----
0089_SW410_21061	Clear Plastic Bottle - Natural	----	10-Jun-2021	11-Jun-2021	×	----	----

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

CHAIN OF CUSTODY

ALS COC#: **23956** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO [redacted]

EMAIL INVOICES TO

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW410		10/06/2021 08:44 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
002	0089_QC114		10/06/2021 08:46 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
003	0089_PW409		10/06/2021 09:18 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
004	0089_pw405		10/06/2021 09:58 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
005	0089_QC115		10/06/2021 10:01 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
006	0089_SW406		10/06/2021 10:05 AM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
007	0089_SW372		10/06/2021 11:50 AM	Water	ALS: 4 Non ALS: 1	No	Partial 7/8	X		
008	0089_SW371		10/06/2021 12:34 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		
009	0089_PW407		10/06/2021 03:30 PM	Water	ALS: 4 Non ALS: 1	No	Partial 7/8	X		

Environmental Division
Perth
Work Order Reference
EP2106590

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

COC#: **23956** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	TOC additional WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SW408		10/06/2021 03:34 PM	Water	ALS: 5 Non ALS: 0	No	Partial 7/8	X		

CHAIN OF CUSTODY

(ALS) COC#: **23956** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO:

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW410	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_QC114	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW409	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_pw405	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_QC115	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **23956** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_SW406	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_SW372	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_SW371	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_PW407	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_SW408	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **23956** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW410	Clear Plastic Bottle - Natural	250 mL	00070220025411	Green	No	
001	0089_SW410	Clear Plastic Bottle - Natural	250 mL	00070220025230	Green	No	
001	0089_SW410	HDPE (no PTFE)	20 mL	00350019151130	Grey	No	
001	0089_SW410	HDPE (no PTFE)	20 mL	00350019150859	Grey	No	
001	0089_SW410	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016841	Purple	No	
002	0089_QC114	Clear Plastic Bottle - Natural	250 mL	00070220025217	Green	No	
002	0089_QC114	Clear Plastic Bottle - Natural	250 mL	00070220025330	Green	No	
002	0089_QC114	HDPE (no PTFE)	20 mL	00350019150836	Grey	No	
002	0089_QC114	HDPE (no PTFE)	20 mL	00350019151041	Grey	No	
002	0089_QC114	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016736	Purple	No	
003	0089_PW409	Clear Plastic Bottle - Natural	250 mL	00070220025378	Green	No	
003	0089_PW409	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016689	Purple	No	
003	0089_PW409	HDPE (no PTFE)	20 mL	00350019151351	Grey	No	
003	0089_PW409	HDPE (no PTFE)	20 mL	00350019151084	Grey	No	
003	0089_PW409	Clear Plastic Bottle - Natural	250 mL	00070220025179	Green	No	
004	0089_pw405	Clear Plastic Bottle - Natural	250 mL	00070220025300	Green	No	
004	0089_pw405	Clear Plastic Bottle - Natural	250 mL	00070220025321	Green	No	
004	0089_pw405	HDPE (no PTFE)	20 mL	00350019151135	Grey	No	
004	0089_pw405	HDPE (no PTFE)	20 mL	00350019150990	Grey	No	
004	0089_pw405	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016764	Purple	No	
005	0089_QC115	HDPE (no PTFE)	20 mL	00350019150909	Grey	No	
005	0089_QC115	HDPE (no PTFE)	20 mL	00350019150940	Grey	No	
005	0089_QC115	Clear Plastic Bottle - Natural	250 mL	00070220025331	Green	No	
005	0089_QC115	Clear Plastic Bottle - Natural	250 mL	00070220025240	Green	No	
005	0089_QC115	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016875	Purple	No	
006	0089_SW406	HDPE (no PTFE)	20 mL	00350019151300	Grey	No	

CHAIN OF CUSTODY

ALS COC#: **23956** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: Ah DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

006	0089_SW406	HDPE (no PTFE)	20 mL	00350019151301	Grey	No	
006	0089_SW406	Clear Plastic Bottle - Natural	250 mL	00070220025162	Green	No	
006	0089_SW406	Clear Plastic Bottle - Natural	250 mL	00070220025228	Green	No	
006	0089_SW406	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016688	Purple	No	
007	0089_SW372	Clear Plastic Bottle - Natural	250 mL	00070220025399	Green	No	
007	0089_SW372	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001052	Purple	No	
007	0089_SW372	HDPE (no PTFE)	20 mL	00350019150919	Grey	No	
007	0089_SW372	HDPE (no PTFE)	20 mL	00350019150890	Grey	No	
008	0089_SW371	Amber TOC Vial - Sulfuric Acid	40 mL	00181020001096	Purple	No	
008	0089_SW371	Clear Plastic Bottle - Natural	250 mL	00070220025293	Green	No	
008	0089_SW371	Clear Plastic Bottle - Natural	250 mL	00070220025256	Green	No	
008	0089_SW371	HDPE (no PTFE)	20 mL	00350019151137	Grey	No	
008	0089_SW371	HDPE (no PTFE)	20 mL	00350019150974	Grey	No	
009	0089_PW407	HDPE (no PTFE)	20 mL	00350019151321	Grey	No	
009	0089_PW407	HDPE (no PTFE)	20 mL	00350019151256	Grey	No	
009	0089_PW407	Clear Plastic Bottle - Natural	250 mL	00070220025166	Green	No	
009	0089_PW407	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016813	Purple	No	
010	0089_SW408	Clear Plastic Bottle - Natural	250 mL	00070220025402	Green	No	
010	0089_SW408	Clear Plastic Bottle - Natural	250 mL	00070220025449	Green	No	
010	0089_SW408	HDPE (no PTFE)	20 mL	00350019150874	Grey	No	
010	0089_SW408	HDPE (no PTFE)	20 mL	00350019151257	Grey	No	
010	0089_SW408	Amber TOC Vial - Sulfuric Acid	40 mL	00181020016739	Purple	No	

Total Bottle Count: ALS: 48, Non ALS: 2

APPENDIX

D

FIELD RECORDS & CALIBRATION CERTIFICATES

Monitoring Date	Specific Site	Monitoring Location	Sample ID	Screen Interval (mbgl)	TOC (mAHD)	Well Depth (m)	SWL Time	SWL (mbTOC)	RWL (mAHD)	Observations on Bore/Site	Sampling Method	Temp (Co)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Dup Sample #	Odour Comments	Colour
9/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW010	0089_MW010_210609	NA	4.859	9.2	10:44	4.535	0.324		HydraSleeve	17.3	1.34	4237	2754	7.53	-224			Clear
8/06/2021	Stirling/Fire Training Area	MW109	0089_MW109_210608	2.5-5.5_	4.446	5.5	10:22	4.03	0.416		HydraSleeve	20	3.03	497.6	323.7	7.52	-170.4			Clear
8/06/2021	Stirling/Fire Training Area	MW112	0089_MW112_210608	3.0 - 6.0	3.973	6	09:36	3.96	0.013		HydraSleeve	20	2.29	548.8	356.2	7.71	36.6			Clear
8/06/2021	Stirling/Fire Training Area	MW117	0089_MW117_210608	3.0 - 6.0	3.762	6	10:08	3.24	0.522	QC106/206	HydraSleeve	20.5	0.95	900	585	7.37	62.6	QC106/206		Clear
8/06/2021	Stirling/Fire Training Area	MW120	0089_MW120_210608	2.5-5.5_	4.409	5.5	09:30	3.96	0.449		HydraSleeve	19.6	1.08	633	409.5	7.7	-33			Clear
8/06/2021	Stirling/Fire Training Area	MW121	0089_MW121_210608	2.7-5.7_	3.7	5.7	08:44	3.25	0.45		HydraSleeve	18.5	4.7	806	526.5	7.68	77			Clear
8/06/2021	Stirling/Fire Training Area	MW123	0089_MW123_210608	4.5-8_	6.62	8	09:11	6.18	0.44	QC102/202	HydraSleeve	18.6	1.84	820	533	7.42	-153.2	QC102/202		Cloudy
8/06/2021	Stirling/Fire Training Area	MW124	0089_MW124_210608	0.75-4_	1.899	4	11:07	1.63	0.269		HydraSleeve	19	0.97	42836	27852.5	7.31	-169.1			Cloudy
8/06/2021	Stirling/Fire Training Area	MW125	0089_MW125_210608	0.9-3.9_	1.882	3.9	11:19	1.63	0.252		HydraSleeve	19	1.02	45553	29614	7.29	-148			Clear
8/06/2021	Stirling/Fire Training Area	MW126	0089_MW126_210608	0.9-3.9_	1.948	3.9	11:30	1.67	0.278		HydraSleeve	19.7	1.29	43757	28437.5	7.33	-225.3			Clear
8/06/2021	Stirling/Fire Training Area	MW127	0089_MW127_210608	0.9-3.9_	1.771	3.9	11:44	1.505	0.266		HydraSleeve	20.1	0.94	40922	26598	7.35	-246.2			Clear
8/06/2021	Stirling/Fire Training Area	MW128		2.5-5.5_	4.537	5.5	10:45	3.69	0.847	Dry at 3.7	HydraSleeve									
8/06/2021	Stirling/Demolition Ground	MW137	0089_MW137_210608	0.9 - 3.9	2.058	3.9	11:49	1.765	0.293		HydraSleeve	17.3	3.45	51860	33710	7.64	131.8			Clear
8/06/2021	Stirling/Demolition Ground	MW139	0089_MW139_210608	2-5_	2.273	5	08:59	1.884	0.389		HydraSleeve	16.9	1.92	3013	1958	7.71	527	Qc101/201		Clear
8/06/2021	Stirling/Demolition Ground	MW141	0089_MW141_210608	2.0 - 5.0	3.025	5	12:17	1.673	1.352		HydraSleeve	19	0.57	33953	22072	7.06	-259.6		sulphur	Clear
8/06/2021	Stirling/Demolition Ground	MW142	0089_MW142_210608	0.25-4_	2.573	4	11:09	2.275	0.298		HydraSleeve	18.7	2.63	37490	24667	7.34	31.7			Brown
8/06/2021	Stirling/Demolition Ground	MW147					12:13		-	DRY	HydraSleeve									
8/06/2021	Stirling/Demolition Ground	MW149	0089_MW149_210608	1.0 - 4.0	2.303	4	10:04	1.975	0.328		HydraSleeve	16.1	0.83	49531	32198	7.24	13.4	QC105/205		
10/06/2021	Stirling/Waste Water Treatment Plant	MW158	0089_MW158_210610	NA	14.541	15.82	13:48	13.991	0.55		HydraSleeve	21.1	1.93	14380	9347	7.76	-23.1			Clear
10/06/2021	Stirling/Waste Water Treatment Plant	MW161	0089_MW161_210610	NA	17.225	18.13	14:24	16.655	0.57		HydraSleeve	20.9	0.64	3886	2525	7.28	45.5			
10/06/2021	Stirling/Waste Water Treatment Plant	MW166	0089_MW166_210610	10-13_	11.89	13	14:41	12.09	-0.2		HydraSleeve	19.2	2.44	5572	3622	7.53	75.2			Clear
10/06/2021	Stirling/Waste Water Treatment Plant	MW171	0089_MW171_210610	28.5-31.5_	29.238	31.5	14:27	28.392	0.846		HydraSleeve	19.9	0.83	15776	10258	10260	7.22			Clear
10/06/2021	Stirling/Waste Water Treatment Plant	MW172			16.772	26	14:26		-	Dry	HydraSleeve									
10/06/2021	Stirling/Waste Water Treatment Plant	MW173	0089_MW173_210610		10.08	11.11	14:11	9.471	0.609		HydraSleeve	21.8	0.53	4549	2957.5	7.23	-282.7		ammonia	Brown
10/06/2021	Stirling/Waste Water Treatment Plant	MW193	0089_MW193_210610	10.5 - 13.5	11.86	13.5	14:20	11.13	0.73		HydraSleeve	20.7	0.23	3135	2041	7.63	-220.2			Cloudy
9/06/2021	Stirling/Waste Water Treatment Plant	MW195D	0089_MW195D_210609	10-13_	4.363	13	10:57	4.055	0.308	Weather rainy and overcast	HydraSleeve	17.4	2.91	26805	17413.5	8	-188.2	QC112/212	Slight sulfur	Cloudy
9/06/2021	Stirling/Waste Water Treatment Plant	MW195S	0089_MW195S_210609	3.5-6.5_	4.571	6.5	11:06	4.055	0.516		HydraSleeve	18.9	2.54	5810	3763	7.78	-106.6			Cloudy
10/06/2021	Stirling/Waste Water Treatment Plant	MW196	0089_MW196_210610	NA	12.75	13.8	14:00	12.36	0.39		Hand Bailer	20.8	4.27	690	448.5	8.32	93.3			Clear
9/06/2021	Stirling/Waste Water Treatment Plant	MW197	0089_MW197_210609	NA	2.28	NA	08:55	1.91	0.37		HydraSleeve	18.5	2.84	7000	4511	8.05	60.1			Cloudy
9/06/2021	Stirling/Waste Water Treatment Plant	MW199	0089_MW199_210609	NA	11.8	NA	08:34	10.34	1.46	Well bent at approx 1.5m, unable to fix with steel bailer	HydraSleeve									Clear
9/06/2021	Stirling/Waste Water Treatment Plant	MW200	0089_MW200_210609	NA	2.07	NA	09:03	1.675	0.395		HydraSleeve	18.5	3.9	9354	6084	7.99	81.2			Clear
10/06/2021	Stirling/Waste Water Treatment Plant	MW202	0089_MW202_210610	NA	2.12	NA	12:21	1.385	0.735		HydraSleeve	21.1	1.08	2432	4581	7.57	-36.4			Clear
9/06/2021	Stirling/Waste Water Treatment Plant	MW203	0089_MW203_210609	NA	10.855	12.9	11:45	10.44	0.415		HydraSleeve	18.9	3.38	1010	656.5	8.09	-0.2			Clear
9/06/2021	Stirling/Helicopter Support Facility	MW214		5.5-9_	8.075	9	14:01		-	Dry	HydraSleeve									
9/06/2021	Stirling/Helicopter Support Facility	MW215		1.5-4.5_	3.794	4.5	13:55		-	Dry at 3.11	HydraSleeve									
9/06/2021	Stirling/Helicopter Support Facility	MW216	0089_MW216_210609	6-9_	8.329	6	13:38	7.752	0.577		HydraSleeve	18.4	3.69	1753	1137.5	7.78	79.3			Cloudy
9/06/2021	Stirling/Helicopter Support Facility	MW217	0089_MW217_210609	6.5-9.5_	8.847	9.5	12:42	8.28	0.567		HydraSleeve	19.3	6.87	733	474.5	8.12	61.3			Clear
9/06/2021	Stirling/Helicopter Support Facility	MW220	0089_MW220_210609	NA	NA	NA	12:50	6.545		Only PFAS Sample collected. not enough water	HydraSleeve									Clear
9/06/2021	Stirling/Helicopter Support Facility	MW224	0089_MW224_210609	11.25-14.25_	13.372	14.25	13:02	12.88	0.492		HydraSleeve	18.5	6.51	860	559	8.04	74.7			Clear
9/06/2021	Stirling/Helicopter Support Facility	MW225		2-5_	4.066	5	12:46		-	Dry	HydraSleeve									
10/06/2021	Stirling/Helicopter Support Facility	MW226	0089_MW226_210610	0.75-3.8_	1.749	3.8	08:41	1.1	0.649		HydraSleeve	20.8	0.9	43023	27966	7.16	-177.6			Clear
10/06/2021	Stirling/Helicopter Support Facility	MW227	0089_MW227_210610	1.25-4.2_	2.961	4.2	15:44	2.488	0.473		HydraSleeve	20.3	1.94	3101	2016	7.6	-186			Clear
10/06/2021	Stirling/Helicopter Support Facility	MW228	0089_MW228_210610	0.75-3.75_	2.23	3.75	09:58	1.675	0.555		HydraSleeve	20.7	0.72	34475	22410	7.38	-121.5			Clear
9/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW233	0089_MW233_210609		3.705	4.968	08:57	2.923	0.782		HydraSleeve	15.7	2.03	419.5	273	7.82	-214.6		slight sulphur	Clear
10/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW236	0089_MW236_210610	NA	4.642	5.66	10:38	4.01	0.632		Hand Bailer	21.9	4.12	726	474.5	8.33	45.7			Clear
10/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW238	0089_MW238_210610		4.827		10:24	4.29	0.537		HydraSleeve	21.3	2.58	779	507	8.44	18.3			Clear
10/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW239	0089_MW239_210610		4.03		10:17	3.511	0.519		HydraSleeve	21	1.22	696	455	7.59	-7.3		diesel	Cloudy,Clear
10/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW240	0089_MW240_210610	NA	4.483	6.8	09:35	3.94	0.543		HydraSleeve	21.4	1.5	942	611	8.28	-3.8			Cloudy
9/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW242	0089_MW242_210609	NA	3.539	4.76	09:24	3.03	0.509		HydraSleeve	20.8	2.48	312.4	203.1	7.81	-40.1			Clear
10/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW243	0089_MW243_210610		4.892		09:34	4.366	0.526		HydraSleeve	20.2	3	825	533	7.65	7.9			Clear
10/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW245	0089_MW245_210610	NA	4.551	5.65	10:10	3.98	0.571		HydraSleeve	21.8	0.88	1155	754	7.36	-137.2		Diesel.	Black
9/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW248	0089_MW248_210609	NA	4.073	NA	10:05	3.745	0.328		HydraSleeve	18.8	1.26	1534	997	7.39	-166.4			Clear
9/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW249	0089_MW249_210609	3.5 - 6.5	5.227		09:23	4.973	0.254		HydraSleeve	19.2	0.94	1243	806	7.32	-159.3		diesel	Black
10/06/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW255	0089_MW255_210610	3-6_	4.609	6	08:52	4.03	0.579		HydraSleeve	20.3	0.99	968	630.5	7.89	-178			Cloudy
10/06/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW256	0089_MW256_210610	3.0 - 6.0	3.835		08:29	3.225	0.61		HydraSleeve	20	0.9	1471	955.5	7.02	-224.8	QC113/213		Cloudy
9/06/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW257	0089_MW257_210609	2.7-5.7_	3.806	5.7	11:31	5.268	-1.462		HydraSleeve	17.8	5.5	491	319.1	8.15	-60.1			Clear
10/06/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW258		3.0 - 6.0			09:18		-	DRY	HydraSleeve									
10/06/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW259	0089_MW259_210610	2.5-5.5_	3.8	5.5	09:46	3.22	0.58		HydraSleeve	19.7	2.79	715	468	8.13	90.8			Clear
9/06/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW261	0089_MW261_210609	3-6_	3.858	6	10:13	3.459	0.399		HydraSleeve	17.9	1.31	2886	1877	7.48	-148.7			Clear
9/06/2021	Stirling/Dredge Spoil / Careening Bay	MW264	0089_MW264_210609	3.0 - 6.0	4.806	6	11:00	4.334	0.472		HydraSleeve	18.6	1.88	1095	715	7.53	-3.9			Clear
9/06/2021	Stirling/Dredge Spoil / Careening Bay	MW268	0089_MW268_210609	2.5 - 5.5	4.056	5.5	11:48	3.664	0.392		HydraSleeve	18.2	1.1	10486	6818.5	7.21	-14.9			Clear
9/06/2021	Stirling/Dredge Spoil / Careening Bay	MW269	0089_MW269_210609	2.5 - 5.5	4.153	5.5	11:27	3.738	0.415		HydraSleeve	17.9	2.07	2223	1443	7.52	-190.2		sulphur	Clear
8/06/2021	Stirling/Demolition Ground	MW272	0089_MW272_210608	0.9 - 3.9	2.226	3.9	10:43	1.511	0.715		HydraSleeve	18.1	0.51	50007	32508	7.47	90.2			Clear
9/06/2021	Stirling/Helicopter Support Facility	MW282	0089_MW282_210609	7.5	5.78	7.5	13:11	5.25	0.53		HydraSleeve	19.2	2.37	1339	871	7.42	80.7			Clear
10/06/2021	Stirling/Accommodation Area	MW288		2.25-5.25_	4.003	5.25	11:28		-	Dry	HydraSleeve									
9/06/2021	Stirling/Accommodation Area	MW289	0089_MW289_210609	3.25-6.25_	4.495	6.25	08:59	3.94	0.555		HydraSleeve	19.7	0.94	2432	1581	7.54	-71.8			Clear
9/06/2021	Stirling/AVCAT Storage and Fuel Farm	MW516	0089_MW516_210609	4.5 - 7.5	6.37	7.5	10:09	6.002	0.368		HydraSleeve	17.7	1.66	1525	994.5	7.23	-4.3			Cloudy
9/06/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW517	0089_MW517_210609	3-6_	4.77	6	11:11	5.25	-0.48		HydraSleeve	16.4	2.87	1131	735	7.48	-79.9			Clear
9/06/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW518	0089_MW518_210609	3.5 - 6.5	5.55	6.5	10:19	4.171	1.379		HydraSleeve	17.2	0.92	1841	1196	7.4	-12.1	QC111/211	slight hydrocarbon	Cloudy

Monitoring Date	Specific Site	Monitoring Location	Sample_ID	Observations	Sampling Method	Temp (Co)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Dup Sample #	Odour	Colour
10/06/2021	Stirling/Waste Water Treatment Plant East	PW304	0089_PW304_210610	Seaweed	peristaltic pump		18.5	4.7	33159	21547.5	7.76	85.6	no	Clear
9/06/2021	Stirling/Helicopter Support Facility	PW306	0089_PW306_210609		peristaltic pump		15.9	4.23	54619	35500	7.95	55.7	no	Clear
9/06/2021	Stirling/Helicopter Support Facility	PW307	0089_PW307_210609		peristaltic pump		15.5	4.86	54395	35362	8.07	45.7	no	Clear
9/06/2021	Stirling/Helicopter Support Facility	PW308	0089_PW308_210609		peristaltic pump		16.5	4.82	53704	34918	8.05	-9.1	no	Clear
9/06/2021	Stirling/Helicopter Support Facility	PW314	0089_PW314_210609		peristaltic pump		15.5	4.12	54449	35399	7.96	42.8	no	Clear
9/06/2021	Stirling/Helicopter Support Facility	PW315	0089_PW315_210609		peristaltic pump		15.2	4.76	54490	35419	8.05	31.1	no	Clear
9/06/2021	Stirling/Helicopter Support Facility	PW316	0089_PW316_210609		peristaltic pump		15.4	5.21	54614	35500	8.08	33.8	no	Clear
8/06/2021	Stirling/Demolition Ground	PW329	0089_PW329_210608		peristaltic pump		15.1	1.22	53614	34851	7.59	-84.4	QC103/203	no	Clear
8/06/2021	Stirling/Demolition Ground	PW330	0089_PW330_210608		peristaltic pump		14.8	2.87	53016	34461	7.21	155.5	no	Clear
8/06/2021	Stirling/Demolition Ground	PW331	0089_PW331_210608		peristaltic pump		15.8	2.18	54740	35582	6.68	94.9	no	Clear
8/06/2021	Stirling/Fire Training Area	PW335	0089_PW335_210608		peristaltic pump		14.6	0.69	53928	35052	7.58	-219.2	no	Clear
8/06/2021	Stirling/Fire Training Area	PW340	0089_PW340_210608		peristaltic pump		14.5	1.3	52583	34177	7.98	-185.2	no	Clear
8/06/2021	Stirling/Fire Training Area	PW341	0089_PW341_210608		peristaltic pump		13.9	1.46	54796	35620	7.92	-154.2	no	Clear
9/06/2021	Stirling/Waste Water Treatment Plant East	PW345	0089_PW345_210609		peristaltic pump		15.6	6.59	51954	33793	7.98	107.2	no	Cloudy
10/06/2021	Stirling/Waste Water Treatment Plant East	PW346	0089_PW346_210610	Lots of seaweed	peristaltic pump		19.3	0.83	51243	33312.5	8.13	34.9	no	Clear
8/06/2021	Stirling/Waste Water Treatment Plant West	PW350	0089_PW350_210608		peristaltic pump		19.1	4.05	55302	35964	8.06	-8.8	no	Clear
8/06/2021	Stirling/Waste Water Treatment Plant West	PW351	0089_PW351_210608		peristaltic pump		17.8	5.19	54474	35408	8.1	53.4	no	Clear
8/06/2021	Stirling/Waste Water Treatment Plant West	PW352	0089_PW352_210608		peristaltic pump		16.9	5.76	54512	35433	8.09	38.8	no	Clear
8/06/2021	Stirling/Demolition Ground	PW356	0089_PW356_210608		peristaltic pump		15.3	1.43	55052	35783	7.79	-89.8	no	Clear
8/06/2021	Stirling/Demolition Ground	PW357	0089_PW357_210608		peristaltic pump		15.6	1.85	54595	35478	7.71	70.5	no	Clear
8/06/2021	Stirling/Demolition Ground	PW358	0089_PW358_210608		peristaltic pump		14.6	2.68	56302	36597	7.86	150.6	QC107/207	no	Clear
8/06/2021	Stirling/Fire Training Area	PW362	0089_PW362_210608		peristaltic pump		14.6	0.96	53285	34638	8.04	-163	no	Clear
8/06/2021	Stirling/Fire Training Area	PW363	0089_PW363_210608		peristaltic pump		14.3	1.26	54079	35152	7.8	-192.7	no	Clear
8/06/2021	Stirling/Fire Training Area	PW364	0089_PW364_210608		peristaltic pump		14.1	1.15	54349	35323	7.77	-148.3	no	Clear
9/06/2021	Stirling/Waste Water Treatment Plant East	PW367	0089_PW367_210609		peristaltic pump		15.3	4.66	54591	35477	8.05	95	no	Cloudy
10/06/2021	Stirling/Waste Water Treatment Plant East	PW368	0089_PW368_210610		peristaltic pump		19.4	5.95	39536	25694.5	8	76.1	no	Clear
9/06/2021	Stirling/Waste Water Treatment Plant East	PW369	0089_PW369_210609	Lots of seaweed on beach	peristaltic pump		16.1	5.59	53760	34944	8.08	101.1	no	Cloudy
10/06/2021	Stirling/Dredge Spoil / Careening Bay	PW374	0089_PW374_210610		peristaltic pump		17.4	3.83	53469	34755.5	8.53	60.3	no	Clear
10/06/2021	Stirling/Dredge Spoil / Careening Bay	PW375	0089_PW375_210610		peristaltic pump		17.5	3.89	53567	34820.5	8.68	54.8	QC118/218	no	Clear
10/06/2021	Stirling/Dredge Spoil / Careening Bay	PW378	0089_PW378_210610		peristaltic pump		18.2	3.57	53363	34684	8.44	38.6	no	Clear
8/06/2021	Stirling/Waste Water Treatment Plant West	PW380	0089_PW380_210608		peristaltic pump		18.5	4.75	54758	35593	8	43.4	no	Clear
8/06/2021	Stirling/Waste Water Treatment Plant West	PW381	0089_PW381_210608		peristaltic pump		17.8	4.69	54811	35627	8.19	-6	no	Clear
8/06/2021	Stirling/Waste Water Treatment Plant West	PW401	0089_PW401_210608		peristaltic pump		18.2	5.21	54562	35465	7.28	40	no	Clear
10/06/2021	Stirling/Helicopter Support Facility	PW405	0089_PW405_210610		peristaltic pump		19.2	5.01	14825	9636	7.9	28.1	QC115/215	no	Clear
10/06/2021	Stirling/Helicopter Support Facility	PW407	0089_PW407_210610		peristaltic pump		18.8	5.41	25729	16725	7.94	-51	no	Clear
10/06/2021	Stirling/Helicopter Support Facility	PW409	0089_PW409_210610		peristaltic pump		18.2	4.24	53924	35049	8.1	29	no	Clear
9/06/2021	Stirling/Helicopter Support Facility	PW411	0089_PW411_210609		peristaltic pump		14.8	4.07	54743	35584	7.85	65.5	no	Clear
9/06/2021	Stirling/Helicopter Support Facility	PW413	0089_PW413_210609		peristaltic pump		15.1	4.56	54691	3553	7.77	54.4	no	Clear
9/06/2021	Stirling/Helicopter Support Facility	PW415	0089_PW415_210609		peristaltic pump		15.1	5.52	54827	35640	7.83	37.5	no	Clear

Site	Monitoring Location	Date	Sample ID	Time	Sampling Method	Sample Depth (m)	WaterBody Depth (m)	Flow Rate	Comments	Temp °C	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Water Colour	Turbidity
Stirling/Fire Training Area	SW134	8/06/2021	0089_SW134_210608		Direct_into_Bottle	0.1	1	Fast	QC110/210	15.6	4.9	54570	35470	8.27	-16	Cloudy	Low
Stirling/Fire Training Area	SW132	8/06/2021	0089_SW132_210608		Direct_into_Bottle	0.1	0.8	Slow		15.6	5.37	54346	35327.5	8.29	-40.1	Cloudy	Low
Stirling/Demolition Ground	SW156	8/06/2021	0089_SW156_210608	09:26	Direct_into_Bottle	0.1	0.2	Fast		16.5	4.02	53625	34858	8.18	127.1	clear	Low
Stirling/Demolition Ground	SW154	8/06/2021	0089_SW154_210608	10:23	Direct_into_Bottle	0.1	0.2	Fast		16.8	5.32	54609	35494	8.22	133	clear	Low
Stirling/Demolition Ground	SW152	8/06/2021	0089_SW152_210608	11:17	Direct_into_Bottle	0.1	0.2	Fast		17.7	4.45	54754	35591	8.23	128.5	clear	Low
Stirling/Demolition Ground	SW150	8/06/2021	0089_SW150_210608	11:45	Direct_into_Bottle	0.1	0.2	Fast	QC109/209	17	3.4	54785	35611	8.24	105.2	clear	Low
Stirling/Fire Training Area	SW130	8/06/2021	0089_SW130_210608	13:11	Direct_into_Bottle	0.1	0.2	Fast		16	1.1	54693	35550	7.83	-185.4	clear	Low
Stirling/Waste Water Treatment Plant West	SW353	8/06/2021	0089_SW353_210608	15:41	Direct_into_Bottle	0.1	0.2	Fast		19	4.34	54564	35466	8.17	13.7	clear	Low
Stirling/Waste Water Treatment Plant West	SW384	8/06/2021	0089_SW384_210608	15:45	Direct_into_Bottle	0.1	0.2	Fast		18.7	4.57	54325	35311	8.16	38.1	clear	Low
Stirling/Waste Water Treatment Plant West	SW383	8/06/2021	0089_SW383_210608	15:47	Direct_into_Bottle	0.1	0.2	Fast		18.5	4.59	54526	35442	8.19	44.3	clear	Low
Stirling/Waste Water Treatment Plant West	SW382	8/06/2021	0089_SW382_210608	15:53	Direct_into_Bottle	0.1	0.2	Fast		18.3	4.54	54459	35399	8.18	47.9	clear	Low
Stirling/Waste Water Treatment Plant East	SW370	9/06/2021	0089_SW370_210609		Direct_into_Bottle	0.1	0.5	Medium	Lots of seaweed	15.6	6.23	54368	35340	8.09	86	Brown (seaweed)	Medium
Stirling/Helicopter Support Facility	SW310	9/06/2021	0089_SW310_210609	13:30	Direct_into_Bottle	0.1	1	Medium		16.5	5.52	54493	35419	8.16	43.3	Clear	Low
Stirling/Helicopter Support Facility	SW412	9/06/2021	0089_SW412_210609		Direct_into_Bottle	0.1	1	Medium		16	6.08	52978	34456.5	7.92	94.4	Clear	Low
Stirling/Helicopter Support Facility	SW414	9/06/2021	0089_SW414_210609		Direct_into_Bottle	0.1	0.9	Slow		16	5.3	53140	34547.5	8.04	88.6	Clear	Low
Stirling/Helicopter Support Facility	SW416	9/06/2021	0089_SW416_210609		Direct_into_Bottle	0.1	1	Slow		16	4.92	53191	34573.5	8.09	85.3	Clear	Low
Stirling/Helicopter Support Facility	SW311	9/06/2021	0089_SW311_210609	13:10	Direct_into_Bottle	0.1	0.3	Fast		16.5	5.13	54469	35409	8.15	26.8	clear	Low
Stirling/Helicopter Support Facility	SW309	9/06/2021	0089_SW309_210609	14:03	Direct_into_Bottle	0.1	1	Fast		16.1	4.36	54535	35449	8.15	8.2	clear	Low
Stirling/Helicopter Support Facility	SW410	10/06/2021	0089_SW410_210610	09:03	Direct_into_Bottle	0.1	1	Medium	QC114/214	18	4.62	52927	34400	8.12	-10	Clear	Medium
Stirling/Helicopter Support Facility	SW406	10/06/2021	0089_SW406_210610		Direct_into_Bottle	0.1	1	Medium		19.1	3.75	53643	34868	8.09	2.2	Clear	Low
Stirling/Waste Water Treatment Plant East	SW372	10/06/2021	0089_SW372_210610	11:49	Direct_into_Bottle	0.3	1	Slow		19.2	3.09	53039	34482	8.68	44.7	Clear	Medium
Stirling/Waste Water Treatment Plant East	SW305	10/06/2021	0089_SW305_210610	12:26	Direct_into_Bottle	0.3	1	Medium		20.5	4.29	53296	34645	8.24	83.2	Ckear	Medium
Stirling/Waste Water Treatment Plant East	SW371	10/06/2021	0089_SW371_210610		Direct_into_Bottle	0.1	1	Medium		20.4	3.64	53197	34577	7.95	50.6	Brown	Medium
Stirling/Dredge Spoil / Careening Bay	SW317	10/06/2021	0089_SW317_210610	15:18	Direct_into_Bottle	0.3	1	Medium		18.1	6.24	53402	34716.5	8.92	37.9	Clear	Medium
Stirling/Dredge Spoil / Careening Bay	SW318	10/06/2021	0089_SW318_210610	15:44	Direct_into_Bottle	0.3	0.5	Medium		18	5.89	53555	34807.5	8.62	60.4	Clear	Medium
Stirling/Helicopter Support Facility	SW408	10/06/2021	0089_SW408_210610	16:10	Direct_into_Bottle	0.1	1	Medium		19.2	4.93	54169	35212	8.1	15.5	Clear	Low
Stirling/Waste Water Treatment Plant East	SW373	10/06/2021	0089_SW373_210610		Direct_into_Bottle	0.1	1	Medium		20.1	1.8	54076	35153	7.72	26.8	Clear	Medium
Stirling/Dredge Spoil / Careening Bay	SW319	10/06/2021	0089_SW319_210610	15:59	Direct_into_Bottle	0.2	1	Medium		17.7	5.27	53503	34781.5	8.56	64.5	Clear	Low

Site	Monitoring Location	Date	Sample ID	Depth of Sediment Sampling (m)	Sampling Method	Sample Condition	Sample Description	Other SS Site Comments ?
Stirling/Waste Water Treatment Plant East	SD304	6/10/21	0089_SD304_210610	0.3	Direct_into_Bottle,Shovel_Trowel	Wet	Sandy yellow. No odour	
Stirling/Helicopter Support Facility	SD306	6/9/21	0089_SD306_210609	0.3	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Helicopter Support Facility	SD307	6/9/21	0089_SD307_210609	0.3	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Helicopter Support Facility	SD308	6/9/21	0089_SD308_210609	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Helicopter Support Facility	SD314	6/9/21	0089_SD314_210609	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Helicopter Support Facility	SD315	6/9/21	0089_SD315_210609	0.8	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Helicopter Support Facility	SD316	6/9/21	0089_SD316_210609	0.3	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Demolition Ground	SD329	6/8/21	0089_SD329_210608	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	yellow sand	QC104/204
Stirling/Demolition Ground	SD330	6/8/21	0089_SD330_210608	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	yellow sand	
Stirling/Demolition Ground	SD331	6/8/21	0089_SD331_210608	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	yellow sand	
Stirling/Fire Training Area	SD335	6/8/21	0089_SD335_210608	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	yellow sand	
Stirling/Fire Training Area	SD340	6/8/21	0089_SD340_210608	0.1	Direct_into_Bottle,Shovel_Trowel	Wet	Grey sand	
Stirling/Fire Training Area	SD341	6/8/21	0089_SD341_210608	0.1	Direct_into_Bottle,Shovel_Trowel	Wet	Grey sand	
Stirling/Waste Water Treatment Plant East	SD345	6/9/21	0089_SD345_210609	0.1	Direct_into_Bottle,Shovel_Trowel	Wet	Beige sand	
Stirling/Waste Water Treatment Plant East	SD346	6/10/21	0089_SD346_210610	0.3	Direct_into_Bottle,Shovel_Trowel	Wet	Sandy yellow. No odour	
Stirling/Waste Water Treatment Plant West	SD350	6/8/21	0089_SD350_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Waste Water Treatment Plant West	SD351	6/8/21	0089_SD351_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Waste Water Treatment Plant West	SD352	6/8/21	0089_SD352_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Demolition Ground	SD356	6/8/21	0089_SD356_210608	0.1	Direct_into_Bottle,Shovel_Trowel	Wet	yellow sand	
Stirling/Demolition Ground	SD357	6/8/21	0089_SD357_210608	0.3	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Demolition Ground	SD358	6/8/21	0089_SD358_210608	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	yellow sand	
Stirling/Fire Training Area	SD362	6/8/21	0089_SD362_210608	0.1	Direct_into_Bottle,Shovel_Trowel	Wet	Grey sand	
Stirling/Fire Training Area	SD363	6/8/21	0089_SD363_210608	0.1	Direct_into_Bottle,Shovel_Trowel	Wet	Grey sand	
Stirling/Fire Training Area	SD364	6/8/21	0089_SD364_210608	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	grey yellow sand	
Stirling/Waste Water Treatment Plant East	SD367	6/9/21	0089_SD367_210609	0.1	Direct_into_Bottle,Shovel_Trowel	Wet	Beige sand	
Stirling/Waste Water Treatment Plant East	SD368	6/10/21	0089_SD368_210610	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	white grey sand	
Stirling/Waste Water Treatment Plant East	SD369	6/9/21	0089_SD369_210609	0.1	Direct_into_Bottle,Shovel_Trowel	Wet	beige sand	
Stirling/Dredge Spoil / Careening Bay	SD374	6/10/21	0089_SD374_210610	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	yellow sand	
Stirling/Dredge Spoil / Careening Bay	SD375	6/10/21	0089_SD375_210610	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	Sandy, no odour	
Stirling/Dredge Spoil / Careening Bay	SD378	6/10/21	0089_SD378_210610	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, sandy, no odour. QC117/217 taken here.	
Stirling/Waste Water Treatment Plant West	SD380	6/8/21	0089_SD380_210608	0.1	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Waste Water Treatment Plant West	SD381	6/8/21	0089_SD381_210608	0.1	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Waste Water Treatment Plant West	SD401	6/8/21	0089_SD401_210608	0.1	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Helicopter Support Facility	SD405	6/10/21	0089_SD405_210610	0.6	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	Qc116/216
Stirling/Helicopter Support Facility	SD407	6/10/21	0089_SD407_210610	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Helicopter Support Facility	SD409	6/10/21	0089_SD409_210610	0.2	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Helicopter Support Facility	SD411	6/9/21	0089_SD411_210609	0.3	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Helicopter Support Facility	SD413	6/9/21	0089_SD413_210609	0.3	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	
Stirling/Helicopter Support Facility	SD415	6/9/21	0089_SD415_210609	0.3	Direct_into_Bottle,Shovel_Trowel	Wet	Sand	

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 21D101799
Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	173.20 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.53
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 11 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	18	0	°C	NA	18	°C
pH	pH 7.00	356684	7.01	-1.80	mV	6.68	7.01	pH
pH	pH 4.00	355385	4.00	171.40	mV	3.58	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.10	2709	2764	µs/cm
ORP (Reference check only)	Zobell A & B	21/0502	244	244	mV	238.7	233.3	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	3.1	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	5.01	uA	101.4	100.0	%

Calibrated by: [redacted]

Calibration Date: 01-Jun-21
Next Due: 28-Nov-21

ZOM 102502

Equipment Calibration Report

Equipment Report – YSI ProPlus

This YSI ProPlus Water Quality Meter (*Unit*) has been performance checked as per the manufacture's guidelines[1].

The Unit has been checked for and comprises of the following items:

Item Present	Item
☑	2 x 12V Batteries
☑	Screw Driver
☑	YSI Cup
☑	Flow Cell
☑	Probe cover for SW sampling

The following tests and operational checks have been conducted on the Unit:

Test Completed	Test Passed	Item
☑	☐	WQM Unit Cleaned & Decontaminated using Decon 90
☑	☐	Operations check (screen functions)
☐	☑	Battery Voltage <7.2 V (12 V)

The Unit has been performance checked and calibrated as follows:

Parameter	Calibration Solution Values	Calibrated Values
Dissolved Oxygen	100% Saturation in Air	99.6%
	0.00% (Na_2SO_4 solution)	0.2%
Conductivity	35000µS/cm	35006
pH	4.00 pH units	4.02
	7.00 pH units	7.00

Checked / Calibrated by: [redacted]

Signed: [redacted]

Date: 7/6/21

[1] Professional Plus YSI User Manual, Published 2009

19L1024 00

Equipment Calibration Report

Equipment Report – YSI ProPlus

This YSI ProPlus Water Quality Meter (*Unit*) has been performance checked as per the manufacture's guidelines[1].

The Unit has been checked for and comprises of the following items:

Item Present	Item
☑	2 x 12V Batteries
☑	Screw Driver
☑	YSI Cup
☑	Flow Cell
☑	Probe cover for SW sampling

The following tests and operational checks have been conducted on the Unit:

Test Completed	Test Passed	Item
☑	☑	WQM Unit Cleaned & Decontaminated using Decon 90
☑	☑	Operations check (screen functions)
☑	☑	Battery Voltage <7.2 V (12 V)

The Unit has been performance checked and calibrated as follows:

Parameter	Calibration Solution Values	Calibrated Values
Dissolved Oxygen	100% Saturation in Air	100.3%
	0.00% (Na_2SO_4 solution)	0%
Conductivity	35000µS/cm	35007
pH	4.00 pH units	4.00
	7.00 pH units	7.05

Checked / Calibrated by: [redacted]

Signed: [redacted]

Date: 7/6/21

[1] Professional Plus YSI User Manual, Published 2009

Date of Bump Test	Project ID	Unit Brand/ Model	Ambient Air Oxygen Calibration	Zero % Oxygen Solution Calibration	Standard Concentrations	Ambient Temperature (°C)	Bump Test Reading	Bump Test Readings within ±5%?	Comment	Test by (Name)	(Signature)
9/6/21	PEF 19C09	YSI #19L102 400	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) N pH 7.00 (Y) N EC: 1,413µS/cm Y (N) 35000µS/cm (Sig Lab)	14.6	pH 4.00: 4.15 pH 7.00: 7.16 Temp: EC: 34956	pH 4.00: (± pH 0.2) (Y) N pH 7.00: (± pH 0.2) (Y) N ~~Temp: (± 2°C)~~ ~~Y / N~~ EC: (± 150µS/cm) (Y) N		[redacted]	[redacted]
9/6/21	" "	YSI #21D 101799	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) N pH 7.00 (Y) N EC: 1,413µS/cm Y (N) 3506µS/cm	14.6	pH 4.00: 4.17 pH 7.00: 7.16 Temp: EC: 34890	pH 4.00: (± pH 0.2) (Y) N pH 7.00: (± pH 0.2) (Y) N ~~Temp: (± 2°C)~~ ~~Y / N~~ EC: (± 150µS/cm) (Y) N ~~Y / N~~		" "	
9/16/21	" "	YSI #19L1024 CO	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) N pH 7.00 (Y) N EC: ~~1,413~~µS/cm 35000 (Y) / N	20.3	pH 4.00: 4.20 pH 7.00: 7.20 ~~Temp:~~ EC: 35019	pH 4.00: (± pH 0.2) (Y) N pH 7.00: (± pH 0.2) (Y) N Temp: (± 2°C) Y / N EC: (± 150µS/cm) (Y) N ~~Y / N~~		" "	
" "	" "	YSI #21D 19799	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) N EC: ~~1,413~~µS/cm 35000 (Y) / N	20.3	pH 4.00: ~~4.19~~ 4.19 pH 7.00: ~~7.20~~ 7.20 ~~Temp:~~ EC: 34950	pH 4.00: (± pH 0.2) (Y) N pH 7.00: (± pH 0.2) (Y) N Temp: (± 2°C) Y / N EC: (± 150µS/cm) (Y) N ~~Y / N~~		" "	
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 1,413µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 1,413µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 1,413µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N Y / N			

APPENDIX

E

DATA QUALITY REVIEW

Data Quality Review
PFAS Ongoing Monitoring Plan Quarterly Monitoring Factual Report

This appendix reviews the Quality Assurance (QA) and Quality Control (QC) documentation. Quality assurance encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation should also include an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples submitted such as field blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

QA/QC Aspects	Evidence & Evaluation
	QA Documentation
Project Quality Plan/Work Plan and Data Quality Objectives	The field investigation was carried out between the 8 June 2021 and 10 June 2021 and is in accordance with the proposed scope of work, as documented in the SAQP (ref DEF19009_ HMAS_Stirling_SAQP_Rev3) issued to the client and in general compliance with the Australian standards AS 4482.1- 2005 "*Guide to Sampling and Investigation of Potentially Contaminated Soil, Part 1: Non-volatile and Semi-volatile Compounds",* Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling* and NEPM "*National Environment Protection (Assessment of Site Contamination) Measure".* A quality control program was implemented during the Investigation and the quality assurance procedures used have been reiterated in the report (DEF19009_2021 Q2 OMP Factual Report_HMAS Stirling). In addition, a Health, Safety and Environment Work Method Statement (HSEWMS) was also prepared. The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.
	Data Representativeness
Use of Composites	No Composites were used during the investigation
Holding Times	Chain of custody and laboratory reports provide evidence of holding times. Holding times were generally compliant with required timeframes. with the exception of the following: **Groundwater/porewater/surface water:** • EP2106448, EP2106450, EP2106464, EP2106465, EP2106514, EP2106515, EP2106516, EP2106517, EP2106519, EP2106579, EP2106580, EP2106582, EP2106588, EP2106590 o pH – 8 to 12 days overdue The holding time exceedances for a pH are not considered to have adversely impacted the reliability of the results obtained, or the conclusions drawn from this assessment. **Sediment:** No holding time non-compliance was reported for the sediment samples.
Background samples	No background samples were collected as part of this investigation.
Verification of field procedures	The methodology conducted during this investigation is documented in the body of the report, and was in general conformance with the SAQP. Non-disposable equipment was decontaminated between sample locations.

<table>
<tr><th>QA/QC Aspects</th><th>Evidence & Evaluation</th></tr>
<tr><td colspan="2">Data Precision & Accuracy</td></tr>
<tr><td>QC sample Frequency</td><td>
<table>
<tr><th>QC sample type</th><th>SAQP required frequency</th><th>Sample Collected</th></tr>
<tr><td>Blind duplicate</td><td>1 in 10 primary water samples (10%)
>1 in 20 primary sediment samples (>5%)</td><td>14 for 127 primary water samples (11.02%)
3 for 39 primary sediment samples (7%)</td></tr>
<tr><td>Split duplicate</td><td>1 in 10 primary water samples (10%)
>1 in 20 primary sediment samples (>5%)</td><td>14 for 127 primary water samples (11.02%)
3 for 39 primary sediment samples (7%)</td></tr>
<tr><td>Rinsate</td><td>1 per day / equipment used</td><td>9 (3x equipment for 3 days) (100%)</td></tr>
<tr><td>Field Blank</td><td>1 per day / field team (esky)</td><td>9 (3x field teams for 3 days) (100%)</td></tr>
</table>
QC sample frequency was compliant with the SAQP for water and sediment duplicates, rinsates and field blanks.</td></tr>
<tr><td>QC Testing – Blind Replicates (Primary Lab)</td><td>
▪ Relative Percentage Difference (RPD) Acceptance Criteria:
<table>
<tr><th>Magnitude of Results</th><th>Acceptable RPD range</th></tr>
<tr><td>< 10 x LOR</td><td>No limits</td></tr>
<tr><td>10 – 20 LOR</td><td>0% - 50%</td></tr>
<tr><td>> 20 x LOR</td><td>0% - 20%</td></tr>
</table>
Groundwater, Porewater & Surface water
▪ Number of primary samples analysed: 127
▪ Duplicate samples analysed: 14
Sediment
▪ Number of primary samples analysed: 39
▪ Duplicate samples analysed: 3
The level of RPD is generally minor and probably related to the low analyte concentrations of analyte pairs.</td></tr>
<tr><td>QC Testing – Field Splits (Secondary Lab)</td><td>
▪ Relative Percentage Difference (RPD) Acceptance Criteria:
<table>
<tr><th>Magnitude of Results</th><th>Acceptable RPD range</th></tr>
<tr><td>< 10 x LOR</td><td>No limits</td></tr>
<tr><td>10 – 20 LOR</td><td>0% - 50%</td></tr>
<tr><td>> 20 x LOR</td><td>0% - 20%</td></tr>
</table>
Groundwater, Porewater & Surface water
▪ Number of Samples Analysed: 141 (including QC)
▪ Field Split Samples Analysed: 14
Sediment
▪ Number of Samples Analysed: 42 (including QC)
▪ Field Split Samples Analysed: 3
The level of RPD is generally minor and probably related to the low analyte concentrations of analyte pairs and/or difference of methodologies between the primary and secondary laboratories.</td></tr>
<tr><td>Field Blanks</td><td>Field Blanks were collected at a rate of one per field team (esky) per fieldwork day. All field blank samples tested reported analytes below the laboratory limit of reporting.</td></tr>
<tr><td>Laboratory Internal QC</td><td>Evidence of the laboratories internal QC testing is present and complete in the reports. ALS (Primary) performed internal QC with adequate testing and</td></tr>
</table>

QA/QC Aspects	Evidence & Evaluation
	satisfactory results for method blank, laboratory control samples and laboratory duplicates. All Matrix Spikes generally reported recoveries within the acceptance range of 70% to 130% with the exception of the following: ▪ EP2106465, EP2106450, EP2106465, EP2106516, EP2106519 - Water sample Sulfate and chloride matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2106448, EP2106450 - Water sample PFOS matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2106448, EP2106450 - Recovery greater than upper data quality objective. ▪ EP2106448, EP2106450 - Recovery less than lower data quality objective. All Method Blank results were generally within acceptable range with exception of the following: ▪ EP2106448, EP2106450 - Method blanks for PFHxA exceed permitted value (Data: 0.02 ug/L Limit: 0.02ug/L). All Quality Control sample frequencies were of an acceptable rate with exception of the following: ▪ EP2106514, EP2106515, EP2106516, EP2106517, EP2106580, EP2106590 - Matrix Spikes and Lab duplicates for PFAS were undertaken less than the target rate. ▪ EP2106464, EP2106519, EP2106579, EP2106582, EP2106588 - Lab duplicates for PFAS were undertaken less than the target rate.
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were generally lower than the respective assessment criteria.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature. ALS Accreditation No. 825 Eurofins Accreditation No. 1261
Calibration of Field Equipment	All equipment used during the investigation was calibrated by the supplier prior to use. The equipment calibration certificates are provided in Appendix D. Cardno undertook in-field calibration checks (bump tests) for each YSI water quality meters per day of sampling. The bump tests found all parameters to be within the acceptable range. As such, Cardno is satisfied that the equipment calibrations were acceptable for this assessment.
Decontamination and Equipment Blanks	Rinsate blanks were collected at a rate of one per day when reusable equipment is used (i.e. YSI, dipper, pore water sampler...). All rinsate samples tested reported analytes concentrations below the laboratory LORs.
	Data Comparability
Standard Procedures	Fieldwork procedures are detailed in the SAQP and reports and are comparable for each phase of Investigation.
Qualified Personnel	Staff involved in managing and reviewing the project and those involved in fieldwork are qualified personnel.
Sample Integrity	Field Chain of Custody/Laboratory request forms can be found in Appendix C.
	Data Completeness
Completeness of test program	The scope of work undertaken was generally consistent with the SAQP.

QA/QC Aspects	Evidence & Evaluation
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection process for groundwater and therefore, the data set used as the basis for groundwater investigation is considered valid and complete.

APPENDIX

F

INFORMATION ABOUT ENVIRONMENTAL REPORTS

About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- A factual report of the condition of a portion of the site or one aspect of an entire site.
- Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- Validation of the success of remediation of a site or a portion of a site.
- Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide "environmental sign-off" of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants' duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the "hot spot" method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as “residential – low density”, “commercial” etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

The ESA Report is prepared in a manner that can be easily read by a lay person with a legitimate interest in the contamination status of the site, such as the site owner or occupier, EPA and Local Planning Authority. The ESA report is not intended for use by other parties or for other purposes. Anyone who uses the assessment report for purposes other than specified in the report, does so at their own risk.

The site should only be used for one or more of the beneficial uses and land uses identified in the ESA as suitable.

The conditions and qualifications may apply to the suitability of the site for use, and it is the responsibility of the Client to be cognizant of and accept these in accepting the report. Cardno are only responsible for the issuing of the ESA report but accepts no liability for the costs incurred in the implementation of ESA findings.

The ESA provides a “snapshot” of the site conditions at the time of the site investigation. Consequently, the report may not be valid at a later time if there has been any change to the contamination status of the site in that time. Verification of the status of the site may be required in cases where a significant time has elapsed, or site conditions have changed since the assessment and audit.

The ESA is necessarily limited by constraints such as time, cost and available information; although normal professional practice at the time has been applied with all due care to prepare the report. A necessary requirement of this process is the horizontal and vertical interpolation of data from discrete locations. However, site conditions are generally not homogenous and some discrepancies will occur between the actual and predicted results at locations not directly sampled. There is a risk that contamination may occur at the site and not be identified by a competent investigation and assessment. The approach adopted in sampling (a combination of statistically based grid and judgmental sampling) seeks to reduce, but cannot eliminate, this risk.

Where unexpected occurrences of contamination arise, subsequent to the issue of the ESA Report, Cardno should be permitted to make an interpretation of these facts in relation to the ESA Report findings. Consequently, the Client should inform Cardno and seek their opinion. Cardno accepts no liability for costs incurred due to such

unexpected occurrences, given the inherent uncertainties in the assessment process.

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Cardno

13 August 2015

PFAS OMP Quarterly Sampling Event Factual Report

September 2021

HMAS Stirling

DEF19009

Prepared for
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Cardno®

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

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Chemical Names

DOC	Dissolved Organic Carbon
DO	Dissolved Oxygen
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Per-fluoro-hexane Sulphonate
PFOA	Per-fluoro-octanoic Acid
PFOS	Per-fluoro-octane Sulfonate
TDS	Total Dissolved Solids (salinity of water)
TOC	Total Organic Carbon
TSS	Total Suspended Solids

Technical Terms

AFFF	Aqueous Film-Forming Foam
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
BGL	Below Ground Level
CEC	Cation Exchange Capacity
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
RWL	Reduced water levels
SAQP	Sampling and Analysis Quality Plan
SWL	Standing water level

Units

ha	Hectares
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

OMP	Ongoing Monitoring Plan
FTG	Fire Training Ground
HSF	Helicopter Support Facility

1 Introduction

1.1 Background

Cardno was engaged by the Australian Department of Defence ("the Client") to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) at HMAS Stirling ("the site"). The site is located on Garden Island, Western Australia and is displayed in Figure 1A of Appendix A.

The OMP was carried out in accordance with the scope and limitations presented in Cardno's Sampling and Analysis Quality Plan (SAQP):

> Cardno, 23 August 2021, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) HMAS Stirling'.

The SAQP was reviewed prior to the monitoring event and the following changes were made:

> Laboratory testing for total organic carbon (TOC), total suspended solids (TSS), total dissolved solids (TDS) and pH were removed from the analytical suite for groundwater, surface water and porewater.

> Laboratory testing for total organic carbon (TOC), cation exchange capacity (CEC) and pH were removed from the analytical suite for sediment.

For the purposes of this report:

> The Management Area was defined as comprising of Garden Island and the marine nearshore environment (Figure 1B, Appendix A).

1.2 Purpose & Objectives

The objective of the OMP is to assess the changes in the nature and extent of PFAS within the environment, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor associated with Defence's historical use of legacy Aqueous Film Forming Foam (AFFF).

The purpose of this PFAS OMP factual report is to provide an up-to-date status of the condition of the site as it is currently understood in relation to the most recent sampling event.

The objectives of the report are:

> To provide a succinct summary of the Q3 2021 sampling event and provision of analytical results with supporting tables and figures.

> To provide confirmation of the current understanding of risk.

> To provide supporting data for the assessment of management actions, where relevant.

1.3 Relevant Guidelines

This assessment has been undertaken in general accordance with applicable industry standards for a site investigation for the purpose, objectives and scope identified in this report. These standards are set out in:

> National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013) (ASC NEPM).

> Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, PFAS National Environmental Management Plan (NEMP) 2.0.

> Australian Standard AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds.

> Standards Australia 1998. AS/NZ 5667:1998 Water quality – sampling.

> Australian and New Zealand Guidelines, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

- Department of Environment and Regulation (DER), 2014, Assessment and Management of Contaminated Sites[1].
- Department of Defence, Department of Energy, 2018, Quality System Manual Schedule B15.
- U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
- USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.
- National Health and Medical Research Council (NHMRC), August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.

2 Scope of Work

Cardno carried out the tasks detailed in the following sections in order to satisfy the purpose and objectives of this assessment.

2.1 Groundwater Monitoring

Sampling of selected groundwater bores was performed in accordance with the SAQP (Cardno, 2021), applying methods set out in Section 3 of this report. The groundwater bores monitored as part of the OMP are presented in Table 2-1, and are shown on Figure 2, Appendix A.

Table 2-1 Groundwater Monitoring Locations

Monitoring Area	Location ID
Demolition Ground	MW137, MW139, MW141, MW142, MW147, MW149, MW272
Fire Training Area	MW109, MW112, MW117, MW120, MW121, MW123, MW124, MW125, MW126, MW127, MW128
Waste water treatment plant	MW158, MW161, MW166, MW171, MW172, MW173, MW193, MW195D, MW195S, MW196, MW197, MW199, MW200, MW202, MW203,
Accommodation Area	MW288, MW289
Dredge Spoil / Careening Bay	MW264, MW268, MW269
AVCAT Storage and Fuel Farm	MW233, MW236, MW238, MW239, MW240, MW242, MW243, MW245, MW516, MW248, MW249
Fire Station, Flammable / Hazardous Goods and Waste Storage, Ship Sullage	MW255, MW256, MW257, MW258, MW259, MW261, MW517, MW518, MW010
Helicopter Support Facility	MW214, MW215, MW216, MW217, MW220, MW224, MW225, MW226, MW227, MW228, MW282

2.2 Porewater, Surface Water and Sediment Monitoring

Porewater, sediment and surface water sampling were performed in accordance with the SAQP (Cardno, 2021), applying methods set out in Section 3 of this report. The porewater, surface water and sediment monitoring locations monitored as part of the OMP are presented in Table 2-2, and are shown on Figures 3 to 5, Appendix A.

[1] It is noted that Site is located on Commonwealth Land and is regulated under the Commonwealth environmental legislation, the State based DWER guidelines are relevant for the sampling of off-Site private properties and waterways.

Table 2-2 Porewater, Surface Water and Sediment Monitoring Locations

Monitoring Area	Porewater Sampling Location ID	Sediment Sampling Location ID	Surface Water Sampling Location ID
Demolition Ground	PW329, PW330, PW331, PW356, PW357, PW358	SD329, SD330, SD331, SD356, SD357, SD358	SW150, SW152, SW154, SW156
Fire Training Area	PW335, PW340, PW341, PW362, PW363, PW364	SD335, SD340, SD341, SD362, SD363, SD364	SW130, SW132, SW134
WWTP	PW304, PW345, PW367, PW368, PW369, PW350, PW351, PW352, PW380, PW381, PW401	SD304, SD345, SD367, SD368, SD369, SD350, SD351, SD352, SD380, SD381, SD401	SW305, SW370, SW371, SW372, SW373, SW353, SW382, SW383, SW384
Accommodation Area	PW346	SD346	
Dredge Spoil / Careening Bay	PW374, PW375, PW378	SD374, SD375, SD378	SW317, SW318, SW319
Helicopter Support Facility	PW306, PW307, PW308, PW314, PW315, PW316, PW405, PW407, PW409, PW411, PW413, PW415	SD306, SD307, SD308, SD314, SD315, SD316, SD405, SD407, SD409, SD411, SD413, SD415	SW309, SW310, SW311, SW406, SW408, SW410, SW412, SW414, SW416

2.3 Data Management

All the data included in the report has been collected, uploaded to the ESdat database and reviewed according to the data management requirements of the Defence Contamination Management Manual (DCMM Annex L).

The sample naming convention detailed in the DCMM Annex L was used in the field.

2.3.1 Defence ESdat database

Data collected as part of the Q3 2021 OMP monitoring event was uploaded to the ESdat database according to the data management requirements of the DCMM Annex L, including:

- All field data collected was uploaded;
- Laboratory data was uploaded and approved; and
- QA/QC data was reconciled.

2.4 Deviations from the OMP SAQP

Deviations from the SAQP for the Q3 2021 monitoring event are presented in Table 2-3 below.

Table 2-3 Deviations from OMP SAQP

Location	Deviation	Comments
MW128, MW137, MW147, MW172, MW173, MW220, MW248, MW225, MW258	Not sampled	These wells were found dry during this monitoring event.
Surface water locations	Sampling Depth	It was not always possible to position the sample container 10 cm below the surface water level due to the waves.

3 Methodology

3.1 Groundwater Sampling Methodology

Groundwater monitoring was generally undertaken by no purge HydraSleeve® method as detailed in Table 3-1.

Table 3-1 Groundwater Sampling Methodology

Activity	Details
Well Gauging	Standing Water Levels (SWL) were gauged using an interface probe. All wells were measured against a specified mark at the top of the well casing. Snap gauging was undertaken in each area presented on Figure 6 (Appendix A) to take in consideration tide influence. Time of gauging was recorded on field records sheets.
Groundwater Field Parameters	Groundwater field parameters were recorded via a down-hole water quality meter (positioned within the mid screen interval) prior to deployment of HydraSleeves® or pre-sample collection. The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Once field parameters have stabilised (as indicated by at least three consecutive measurements falling within +/- 10% of each other) measurement were recorded on field data records. All field instruments (e.g. water quality meter) were calibrated by the equipment supplier and bump tested daily to optimise the accuracy of the measurements taken. Calibration certificates and bump test records are provided in Appendix D.
Deployment of HydraSleeve	HydraSleeve were deployed with top weight for sample collection to begin at the lowest point. Following sampling, hydrasleeves were deployed in preparation for the next OMP monitoring event using the same string for consistency (same depth of sampling i.e. within screen depth).
Retrieval of HydraSleeves (Sample Collection)	HydraSleeve sampling devices were left in wells for a minimum of 24 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples were collected via continuous pull method at a rate allowing the water to pass through the check value into the sample sleeve. Samples were discharged immediately (minimise changes in chemistry) via discharge tube.
Hand bailing (alternative sampling method)	Disposable HDPE hand bailers, attached to a polypropylene string, were used at wells where the water column wasn't sufficient to fill the hydrasleeve. Purging of the well was undertaken prior to sampling to make sure that a sample representative of the aquifer is taken (i.e. removal of 3x well volume). A sample was collected once field parameters had stabilised.
Decontamination procedure	Dedicated HydraSleeves were used at each groundwater bore thus removing the need for decontamination. All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate). Where holding times did not comply, this is discussed in the data quality review in Appendix E.
Quality Control	Groundwater QC samples were collected at the following frequencies:

Activity	Details
	▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples sent to a secondary laboratory.
Laboratory Testing	Groundwater samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance). The primary laboratory was ALS Global Laboratories (Perth), and the secondary laboratory (quality control) was Eurofins (Perth). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix C.

3.2 Porewater and Sediment Sampling Methodology

The methodologies for sediment and porewater sampling are detailed in Table 3-2 and Table 3-3 respectively.

Table 3-2 Sediment Sampling Methodology

Item	Details
Sample Collection	Sediment samples were collected at the sediment/water interface using hand tools (e.g. trowel, hand auger, PVC pipe etc.) with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under CoC documentation.
Field Parameters	At each sampling location, the sediment sample was visually assessed and observations (including physical description) were recorded on field data sheets.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Quality Control	Sediment QC samples were collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples greater than 1 per 20 primary samples. ▪ Field triplicate (inter-laboratory) samples greater than 1 per 20 primary samples sent to a secondary laboratory.
Laboratory Testing	Sediment samples were submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes).

Table 3-3 Porewater Sampling Methodology

Item	Detail
Porewater Sample Collection	Porewater sampling was undertaken in accordance with the USEPA guidance *Operating Procedure Pore Water Sampling*. Porewater was purged and sampled at less than 1 L per minute using a peristaltic pump, connected to a stainless steel tube with a screened section at its base (Drive-Point Piezometer). The porewater sampler was inserted to at least 1 m below the surficial marine sediments, to ensure collection of pore water rather than surface water. Tubing was replaced at each sampling location to prevent cross-contamination.
Field parameters	The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.

Item	Detail
Sample identification, preservation, transport and holding times.	As detailed in Table 3-1.
Quality Control	Porewater QC samples were collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples sent to a secondary laboratory.
Laboratory Testing	Porewater samples were submitted for the same analysis as groundwater samples (refer to Table 3-1).

3.3 Surface Water Sampling Methodology

The methodology for the surface water monitoring is detailed in Table 3-4.

Table 3-4 Surface water Sampling Methodology

Item	Details
Field parameters	The following field parameters were recorded using a pre-calibrated water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Field observations such as odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Surface water samples were collected directly into sample containers using a 'Grab' (manual) sample method via a long-handled sampling device. The sample container was positioned 10 cm below the surface water level where possible and above the sediment bed and oriented with the capped opening facing downwards to avoid the collection of surface films. Samples were decanted into the laboratory supplied sample containers. Samples were collected in accordance with Australian/New Zealand Standards (AS/NZS 5667.1:1998) '*Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*'.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation, transport and holding times.	As detailed in Table 3-1.
Quality Control	Surface water QC samples were collected at the following frequencies: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples sent to a secondary laboratory.
Laboratory Testing	Surface water samples were submitted for the same analysis as groundwater samples (refer to Table 3-1).

3.4 Quality Control / Quality Assurance

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following data quality indicators, as described in the SAQP:

> QA documentation.

> Bias.

- Data Representativeness.
- Data Precision & Accuracy.
- Laboratory Performance.
- Data Comparability.
- Data Set Completeness.

A detailed review of these aspects has been undertaken, the results of which are presented in Appendix E. The QA/QC review concluded that there are no significant systematic errors in the data collection process and therefore, the dataset used for the assessment is considered valid and complete.

3.5 Assessment Criteria

3.5.1 Groundwater, Porewater and Surface Water

The adopted assessment criteria for groundwater, porewater and surface water are detailed in Table 3-5.

Table 3-5 Criteria for Groundwater, Porewater and Surface Water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	µg/L		
Human Health - Drinking Water Quality Guideline	0.07[1]	0.56	HEPA 2020
Human Health – Recreational Water	2[1]	10	NHMRC 2019
Ecological – 99% species protection	0.00023[2]	19	HEPA 2020

Notes:

1. Sum of PFOS and PFHxS.
2. PFOS only; The criterion of 0.00023 µg/L is lower than the laboratory level of reporting (LOR), however, the PFAS NEMP 2020 allows for the adoption of the laboratory LOR as a screening level rather than a quantified measurement.

3.5.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment. Sediment will be assessed against the NEMP (HEPA, 2020) soil criteria for consistency with the SAQP (Cardno, 2021), DSI (RPS, 2018b) and ERA (RPS, 2018c). The adopted assessment criteria for sediments are detailed in Table 3-6.

Table 3-6 Criteria for Sediment

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	mg/kg		
Human Health - Commercial / industrial (on-base activities)	20[1]	50	HEPA 2020
Ecological - Open space – direct exposure (interim guidelines)	1[2]	10	HEPA 2020
Ecological - Industrial /Commercial – indirect exposure (interim guidelines) (on site)	0.01[2]	-	HEPA 2020

Notes:

1. Sum of PFOS and PFHxS.
2. PFOS only

4 Field Observations and Results

4.1 General Site Observations

No weather event or Site activities that could have impacted the sampling or results obtained were observed.

4.2 Groundwater

4.2.1 Summary of Field Observations

4.2.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the groundwater sampling event are presented in field sampling record sheets, included in Appendix D. Parameters were generally consistent with the previous monitoring event. Groundwater pH was near neutral, water was clear to brown in colour and fresh to saline. Groundwater temperature ranged from 15.6°C (MW141) to 24.1°C (MW233). DO readings mostly indicate aerobic groundwater condition. EC readings ranged from 328.8 µS/cm (MW257) to 51,642 µS/cm (MW149) and indicate fresh to highly-saline groundwater conditions. There was some olfactory evidence of contamination recorded, with a sulphur or fuel smell noted at several groundwater wells.

4.2.1.2 Groundwater Elevation and Migration

Groundwater gauging data and reduced water levels (RWL) are provided within the field records in Appendix D. The groundwater elevations ranged between -0.575 mAHD (MW121) and 2.625 mAHD (MW161). It is expected that groundwater levels and migration are locally and temporally influenced by the tides.

Gauging data was used to infer the groundwater migration contours in discreet areas of the site. Groundwater flow was interpreted to be radial from the site (i.e. groundwater flows towards the ocean), which is consistent with previous monitoring events. Groundwater inferred elevation contours and flow direction for the Q3 2021 monitoring event are shown in Figure 6, Appendix A.

4.2.2 Groundwater Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-1. Laboratory results have also been compared to available historical data in order to identify monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 2 in Appendix A presents the groundwater monitoring locations. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-1 Summary of Groundwater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	MW112, MW117, MW120, MW121, MW141, MW193, MW236, MW272, MW282	0.56[2]	9.37 (MW282)	60	9
Sum of PFHxS and PFOS	MW109, MW112, MW117, MW120, MW121, MW123, MW125, MW141, MW142, MW161, MW166, MW171, MW193, MW202, MW203, MW215, MW216, MW217, MW228, MW288, MW233, MW236, MW240, MW243, MW245, MW248, MW249, MW255, MW256, MW257, MW259, MW261, MW264, MW268, MW269, MW272, MW282, MW288, MW289, MW516	0.07[2]	116 (MW141)	60	38
PFOS	MW010, MW109, MW112, MW117, MW120, MW121, MW123, MW125, MW141, MW142, MW161, MW166, MW193, MW202, MW216, MW217, MW288, MW233, MW236, MW243, MW245, MW249, MW255, MW256, MW257, MW259, MW264, MW269, MW272, MW282, MW288, MW289, MW516	0.01[3]	89.9 (MW117)	60	32

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – drinking water
3. LOR adopted instead of HEPA (2020) guideline value for ecological – 99% species protection

Findings are summarised as follows:

- One groundwater sampling locations (MW120) reported a first exceedance of the drinking water criteria (0.56 µg/L) for PFOA. The locations had previously reported exceedances of the drinking water guideline for the sum of PFOS and PFHxS.
- One groundwater sampling location (MW203) reported a first exceedance of the drinking water criteria (0.07 µg/L) for sum of PFOS and PFHxS.
- One groundwater sampling location (MW215) reported a first time detect of sum of PFOS and PFHxS (0.01 µg/L) above the laboratory LOR and above the drinking water criteria for sum of PFOS and PFHxS (0.07 µg/L).
- One groundwater sampling location (MW228) reported a first time detect of PFOA (0.01 µg/L) above the laboratory LOR.
- One groundwater sampling location (MW272) reported a first time detect of PFOA (0.01 µg/L) above laboratory LOR and a first time exceedance of PFOA above the drinking water criteria (0.56 µg/L). This sampling location also reported a first-time exceedance of the drinking water criteria for sum of PFOS and PFHxS (0.07 µg/L).

4.3 Porewater

4.3.1 Summary of Field Observations

4.3.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the porewater sampling program are presented in field sampling record sheets, included in Appendix D. Parameters were generally consistent with the previous monitoring event. Porewater pH was near neutral, with a temperature oscillating between 14.9°C (PW329) and 20.6°C (PW308) (mean=16.82°C). Water was generally clear and EC/TDS readings indicate saline to highly-saline porewater conditions. DO readings mostly indicate aerobic porewater conditions. No visual or olfactory evidence of contamination were recorded.

4.3.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-2. Laboratory results have also been compared to available historical data. Figure 4 in Appendix A presents the porewater monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-2 Summary of Porewater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	0.56[2]	<0.01	39	0
Sum of PFHxS and PFOS	PW346, PW380	0.07[2]	0.39 (PW346)	39	2
PFOS	PW304, PW315, PW346, PW352, PW368, PW374, PW375, PW378, PW380, PW381	0.01[3]	0.34 (PW346)	39	10

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria

Notes:
1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – drinking water
3. LOR adopted instead of HEPA (2020) guideline value for ecological – 99% species protection

Findings are summarised as follows:

> No first time detect of PFOA or the sum of PFOS and PFHxS above the LOR or new exceedance of guideline values were reported for the porewater monitoring locations in Q3 2021.

4.4 Surface Water

4.4.1 Summary of Field Observations

4.4.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the surface water sampling program are presented in field sampling record sheets, included in Appendix D. Parameters were generally consistent with the previous monitoring event. Surface water pH was near neutral, temperature was 17.9°C on average, water was clear and EC readings (average of 51,085 µS/cm) indicate highly-saline conditions. DO readings indicate aerobic surface water conditions. No visual or olfactory evidence of contamination were recorded.

4.4.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. A summary of results exceeding the adopted criteria is presented in Table 4-3. Laboratory results have also been compared to available historical data. Figure 3 in Appendix A presents the surface water monitoring locations where a first time detection of Sum of PFOS and PFHxS or PFOA or a new exceedance of guideline values were reported. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-3 Summary of surface water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results[1]	No. Results Above Criteria
PFOA	-	0.56[2]	<0.01	28	0
Sum of PFHxS and PFOS	SW373, SW382	0.07[2]	0.40 (SW373)	28	2
PFOS	SW373, SW382, SW384	0.01[3]	0.37 (SW3)	28	3

Notes:
1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – drinking water
3. LOR adopted instead of HEPA (2020) guideline value for ecological – 99% species protection

Findings are summarised as follows:

> No first time detect of PFOA or the sum of PFOS and PFHxS above the LOR or new exceedance of guideline values were reported for the surface water monitoring locations in Q3 2021.

4.5 Sediment

4.5.1 Summary of Field Observations

Observations recorded during the sediment sampling program are provided in the field sampling record sheets within Appendix D.

4.5.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. Soil criteria are adopted in the absence of criteria for sediment for consistency with the SAQP (Cardno, 2021), DSI (RPS, 2018b) and ERA (RPS, 2018c). A summary of results is presented in Table 4-4. Laboratory results have also been compared to available historical data. Figure 5 in Appendix A presents the sediment monitoring locations. Tabulated results including non-PFAS analytes are presented in Appendix B and the laboratory reports are provided in Appendix C.

Table 4-4 Summary of Sediment Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (mg/kg)	Max Conc. (mg/kg)	No. Analytical Results[4]	No. Results Above Criteria
PFOA	-	10[1]	<0.0002	39	0
Sum of PFHxS and PFOS	-	20[3]	0.0024 (SD346)	39	0
PFOS	-	0.01[2]	0.0024 (SD346)	39	0

Notes:

1. Ecosystems – open space – direct exposure
2. Ecological - indirect exposure
3. Human health – comm/industrial
4. Non-inclusive of quality control samples

Findings are summarised as follows:

> No first time detect of PFOA or the sum of PFOS and PFHxS above the LOR or new exceedance of guideline values were reported for the sediment monitoring locations in Q3 2021.

4.6 Changes to the Monitoring Network Condition

The following change to the monitoring network was observed:

> MW225, MW288, MW214 and MW215 were unblocked with the help of a steel bailer and sampled, these wells were sampled for the first time in several monitoring rounds.

No other change to the monitoring network that could have impacted the data integrity was recorded since the Q3 2021 monitoring event.

5 Summary and Conclusions

Cardno undertook the 2021 Q3 groundwater, porewater, surface water and sediment monitoring event at HMAS Stirling as part of the PFAS OMP. Groundwater sampling and testing was undertaken at 60 monitoring bores, 28 surface water locations and 39 sediment and porewater co-located sampling locations. Nine (9) monitoring wells could not be sampled as the wells were found dry.

Groundwater levels were gauged in all wells before sampling. Groundwater flow was interpreted to be radial from the site where mounding of groundwater is occurring (i.e. groundwater flows towards the ocean), consistent with the previous monitoring events.

The groundwater laboratory results reported the following:

- Of the 60 samples that were tested, PFOA (9 samples), PFOS (32 samples) and Sum of PFHxS and PFOS (38 samples) reported concentrations that exceeded adopted assessment criteria.
- One groundwater sampling location (MW120) reported a first exceedance of the HEPA (2020) drinking water criteria (0.56 µg/L) for PFOA. The location had previously reported exceedances of the drinking water guideline for the sum of PFOS and PFHxS.
- One groundwater sampling location (MW203) reported a first exceedance of the HEPA (2020) drinking water criteria (0.07 µg/L) for sum of PFOS and PFHxS.
- One groundwater sampling location (MW215) reported a first time detect of sum of PFOS and PFHxS (0.01 µg/L) above the laboratory LOR and above the HEPA (2020) drinking water criteria for sum of PFOS and PFHxS (0.07 µg/L).
- One groundwater sampling location (MW228) reported a first time detect of PFOA (0.01 µg/L) above the laboratory LOR.
- One groundwater sampling location (MW272) reported a first time detect of PFOA (0.01 µg/L) above the laboratory LOR and a first time exceedance of PFOA above the HEPA (2020) drinking water criteria (0.56 µg/L). This groundwater sampling location also reported a first-time exceedance of the HEPA (2020) drinking water criteria for sum of PFOS and PFHxS (0.07 µg/L).

The surface water laboratory results reported the following:

- Of the 28 samples tested, PFOS (3 samples) and sum of PFOS and PFHxS (2 samples) were reported above the adopted assessment criteria.
- No first time detect of PFOA or the sum of PFOS and PFHxS above the LOR or new exceedance of guideline values was reported for the surface water monitoring locations.

The porewater laboratory results reported the following:

- Of the 39 samples that were tested, PFOS (10 samples) and Sum of PFOS and PFHxS (2 samples) reported concentrations above adopted assessment criteria.
- No first time detect of PFOA or the sum of PFOS and PFHxS above the LOR or new exceedance of guideline values were reported for the porewater monitoring locations.

The sediment laboratory results reported the following:

- Of the 39 samples that were tested, no sampling locations reported a first time detection or concentrations above adopted assessment criteria.

The following actions are recommended to be undertaken prior to the next monitoring event:

- Installation of new groundwater monitoring bores to replace constantly dry bores MW128, MW220, MW225 and MW258.

The next OMP sampling event for HMAS Stirling will be the quarterly monitoring event (Q4 2021), scheduled for December 2021. An Annual Interpretive Report will be prepared following the September 2021 monitoring event for the 2020 –2021 reporting period.

6 References

General References

1. Australian Standard AS 4482-2005 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 – Non-volatile and semi-volatile compounds.
2. Australian Standard AS 4482-1999 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 2 – Volatile substances.
3. Australian Water Quality Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ, 2000).
4. *Contaminated Sites Act 2003*, Western Australia.
5. Department of the Environment and Energy (2017) in the National Greenhouse and Energy Reporting Scheme Measurement Technical Guidelines for the Estimation of Emissions by Facilities in Australia.
6. Department of Environment Regulation (DER), 2014, *Assessment and Management of Contaminated Sites*.
7. Department of Water and Environment Regulation (DWER), 2018, Perth Groundwater Atlas, (https://maps.water.wa.gov.au/#/webmap/gwm).
8. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, '*Guidance on Environmental Data Verification and Data Validation'.*
9. The Heads of EPAs Australia and New Zealand (HEPA; 2020) PFAS National Environmental Management Plan (NEMP) 2.0, January 2020.
10. National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended), registered May 2013.
11. National Health and Medical Research Council (NHMRC) (2011 – updated 2018) National Water Quality Management Strategy Australian Drinking Water Guidelines 6, August 2018
12. NHMRC, August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.
13. Standards Australia/Standards New Zealand (1998) AS5667.1:1998 *'Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples'*.
14. U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
15. USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.

Site Specific References

16. Department of Defence, January 2019, HMAS Stirling Garden Island PFAS Management Area Plan, Final.
17. Cardno, 23 August 2021, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) HMAS Stirling'. Rev 5
18. Cardno, 16 April 2020, PFAS OMP 2019 Q4 Quarterly Monitoring Factual Report, HMAS Stirling
19. Cardno, 14 May 2020, PFAS OMP 2020 Q1 Quarterly Sampling Event Factual Report, HMAS Stirling
20. Cardno, 23 September 2020, PFAS OMP 2020 Q2 Quarterly Sampling Event Factual Report, HMAS Stirling
21. Cardno, 22 January 2021, PFAS OMP 2020 Q3 Quarterly Sampling Event Factual Report, HMAS Stirling
22. Cardno, March 2021, PFAS OMP 2020 Q4 Quarterly Sampling Event Factual Report, HMAS Stirling
23. Cardno, June 2021, PFAS OMP 2021 Q1 Quarterly Sampling Event Factual Report, HMAS Stirling
24. Cardno, August 2021, PFAS OMP 2021 Q2 Quarterly Sampling Event Factual Report, HMAS Stirling
25. RPS, October 2018, HMAS Stirling - PFAS Ongoing Monitoring Plan, Ref. EEC16094.005 (RPS, 2018a).
26. RPS, May 2018, Detailed Site Investigation – HMAS Stirling PFAS Investigation, Ref. EEC16094.003 (RPS, 2018b).

27. RPS, September 2018, HMAS Stirling Garden Island PFAS Investigation Ecological Risk Assessment. Ref. EEC16094.009 (RPS, 2018c).

APPENDIX A

FIGURES

FIGURE 1A

1:32,000 Scale at A3

Meters

0 500 1,000

Site Location

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-07-26 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-001_RegionalLocation 02.mxd
Aerial Imagery Supplied by Google Map

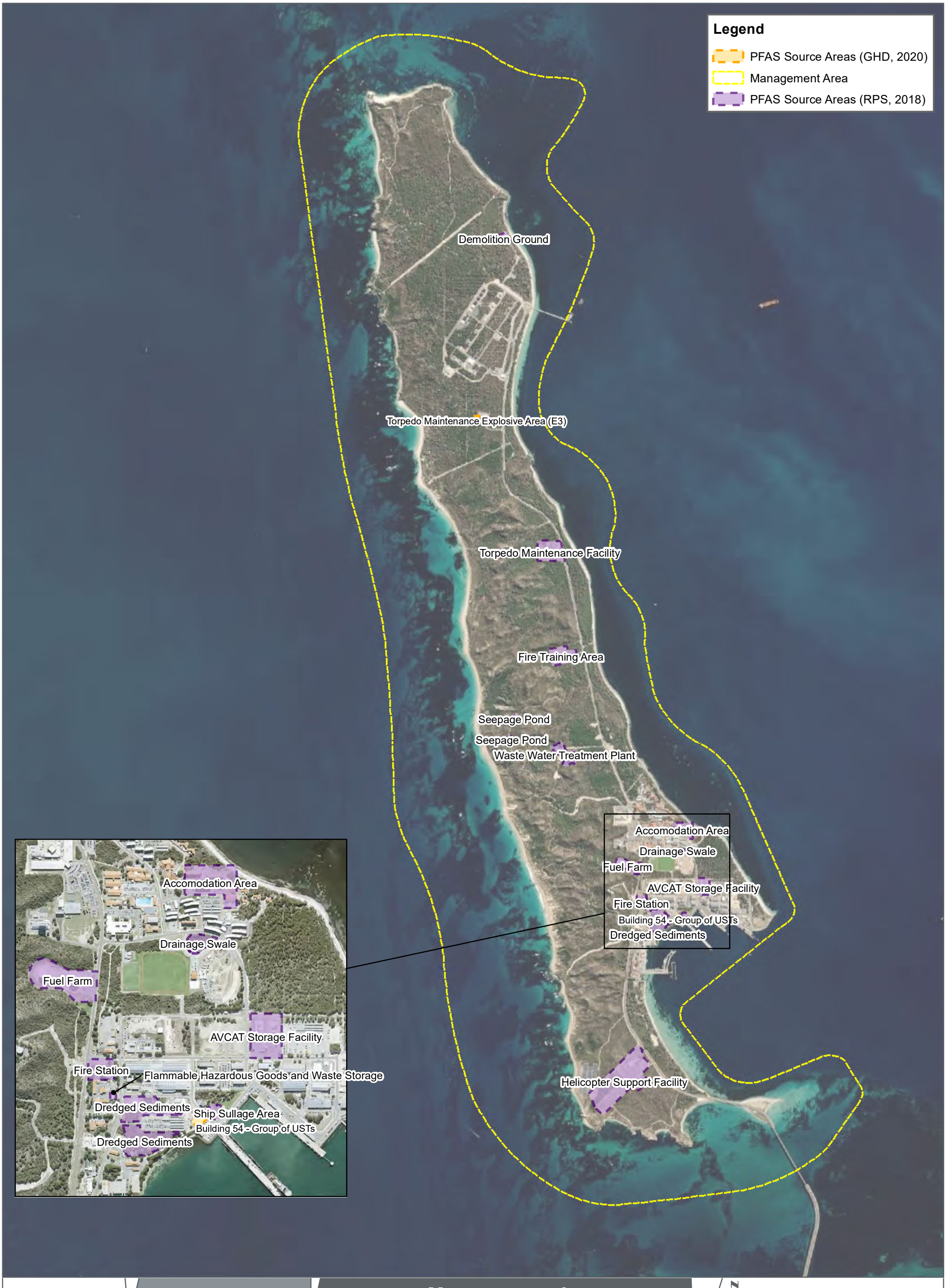


FIGURE 1B

1:32,000 Scale at A3

Meters

0 500 1,000

Management Area

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-07-08 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-001B_ManagementArea 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

Notes:
DW: Human Health Drinking Water Guideline (HEPA, 2020)

MW120
PFOA >DW

MW203
Sum of PFOS+PFHxS >DW

MW215
Sum of PFOS+PFHxS >DW

MW228
PFOA - First Detect Above LOR

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

Groundwater Results Summary

- New exceedance of guideline value (3)
- First time detect of PFOA or PFOS+PFHxS (1)
- No first detect or new exceedance (51)
- Not sampled (7)

FIGURE 2A

1:12,500 Scale at A3

Meters

0 300 600

Groundwater Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-11-11 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-002A_2021Q3_GWResultSummary_PFAS 02.mxd
Aerial Imagery Supplied by Google Earth & Nearmap

Notes:
DW: Human Health Drinking Water Guideline (HEPA, 2020)
Human Health: Human Health Recreational Water (NHMRC, 2019)

MW272
Sum of PFOS+PFHxS >DW and Human Health
PFOA >DW

MW142
MW272
MW149
MW139

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

Groundwater Results Summary

- New exceedance of guideline value (1)
- First time detect of PFOA or PFOS+PFHxS (0)
- No first detect or new exceedance (4)
- Not sampled (2)

FIGURE 2B

1:15,000 Scale at A3

Meters
0 250 500

Groundwater Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-09-20 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-002B_2021Q3_GWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

SW371
SW130
SW132
SW134
SW305
SW372
SW373
SW353
SW384
SW383
SW382
SW370
SW371
SW305
SW373
SW372
SW317
SW318
SW319
SW317
SW319
SW318
SW406
SW408
SW410
SW412
SW414
SW416
SW309
SW310
SW311

Legend

Surface Water Results Summary

- No first time detect or new exceedance
- First time detect of PFOA or PFOS+PFHxS
- New exceedance of guideline value
- Management Area
- PFAS Source Areas (RPS, 2018)

FIGURE 3A

1:15,000 Scale at A3

Meters

0 300 600

Surface water Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-09-20 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003A_2021Q3_SWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

SW150
SW152
SW154
SW156
SW150
SW156
SW154

Legend

- Management Area
- PFAS Source Areas (RPS, 2018)

Surface Water Results Summary

- No first time detect or new exceedance
- First time detect of PFOA or PFOS+PFHxS
- New exceedance of guideline value

FIGURE 3B

1:15,000 Scale at A3

Meters

0 300 600

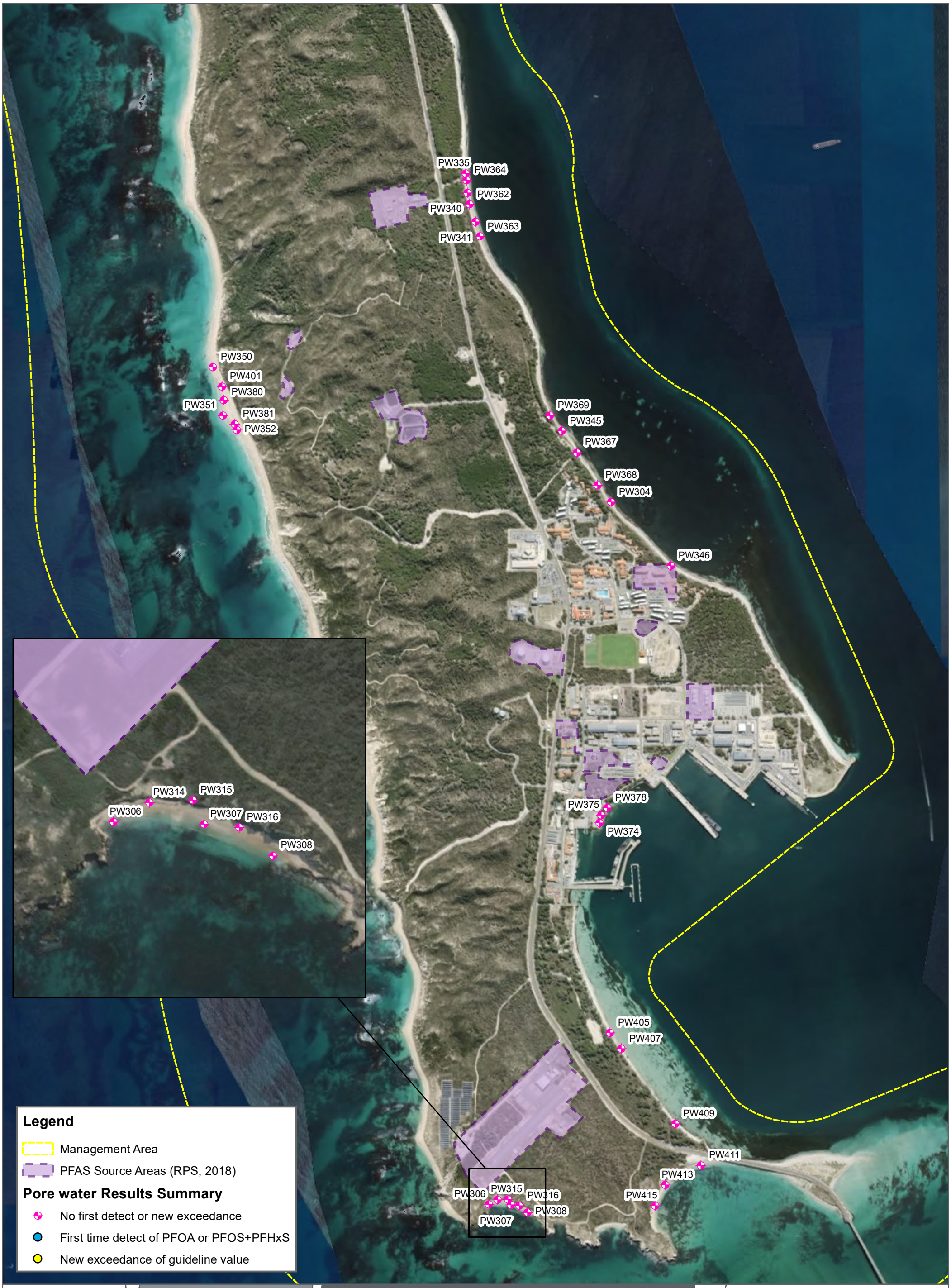
Surface water Results

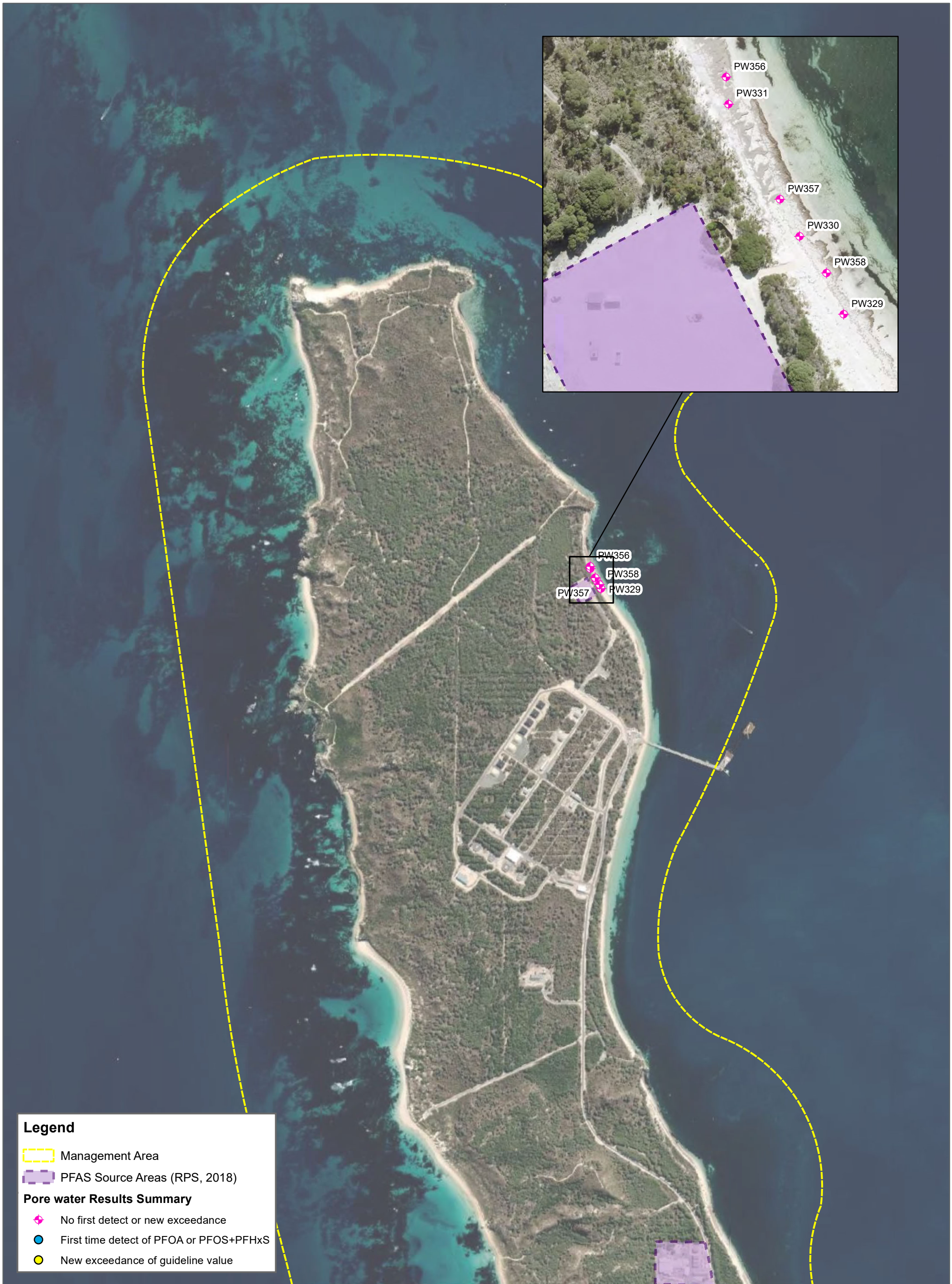
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-09-20 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-003B_2021Q3_SWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Nearmap


PW335
PW364
PW362
PW340
PW363
PW341
PW350
PW401
PW380
PW351
PW381
PW352
PW369
PW345
PW367
PW368
PW304
PW346
PW314
PW315
PW306
PW307
PW316
PW308
PW378
PW375
PW374
PW405
PW407
PW409
PW411
PW413
PW415
PW306
PW315
PW316
PW308
PW307
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Pore water Results Summary
No first detect or new exceedance
First time detect of PFOA or PFOS+PFHxS
New exceedance of guideline value
FIGURE 4A
1:15,000 Scale at A3
Meters
0
300
600
Porewater Results
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-09-20 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-004A_2021Q3_PWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap


PW356
PW331
PW357
PW330
PW358
PW329
PW356
PW358
PW329
PW357
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Pore water Results Summary
No first detect or new exceedance
First time detect of PFOA or PFOS+PFHxS
New exceedance of guideline value
FIGURE 4B
1:15,000 Scale at A3
Meters
0
300
600
Porewater Results
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-09-21 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-004B_2021Q3_PWResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

SD335
SD364
SD362
SD340
SD363
SD341
SD350
SD401
SD380
SD381
SD351
SD352
SD369
SD345
SD367
SD368
SD304
SD346
SD314
SD315
SD306
SD307
SD316
SD308
SD375
SD378
SD374
SD405
SD407
SD409
SD411
SD413
SD415
SD306
SD315
SD316
SD307
SD308
Legend
Management Area
PFAS Source Areas (RPS, 2018)
Sediment Results Summary
No first detect or new exceedance
First time detect of PFOA or PFOS+PFHxS
New exceedance of guideline value
FIGURE 5A
1:15,000 Scale at A3
Meters
0
300
600
Sediment Results
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-09-20 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-005A_2021Q3_SDResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap

FIGURE 5B

1:15,000 Scale at A3

Meters

0 300 600

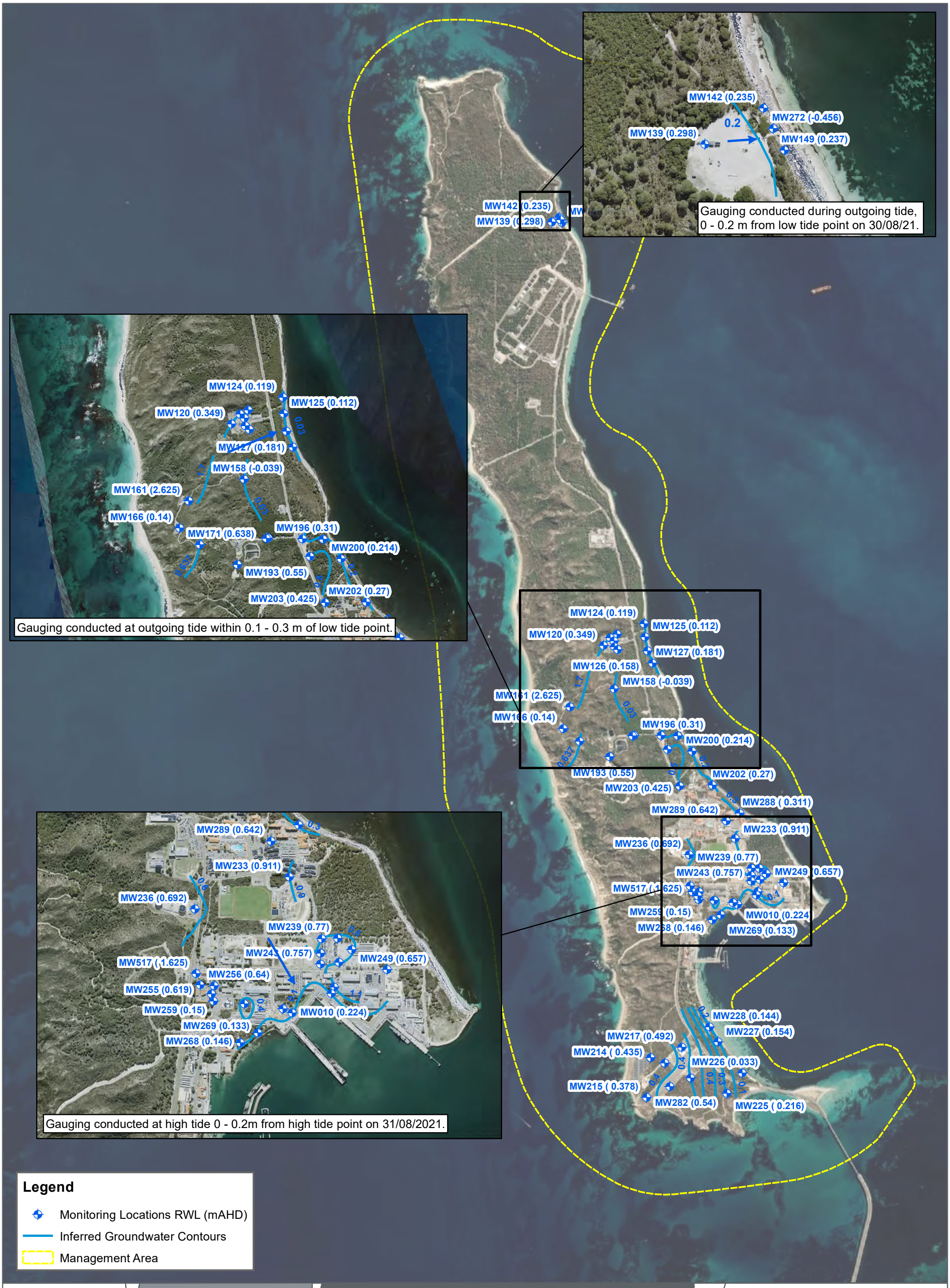
Sediment Results

QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-09-20 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-005B_2021Q3_SDResultSummary_PFAS 01.mxd
Aerial Imagery Supplied by Google Earth & Metromap


MW142 (0.235)
MW272 (-0.456)
MW139 (0.298)
0.2
MW149 (0.237)
Gauging conducted during outgoing tide, 0 - 0.2 m from low tide point on 30/08/21.
MW142 (0.235)
MW139 (0.298)
MW124 (0.119)
MW125 (0.112)
MW120 (0.349)
MW127 (0.181)
MW126 (0.158)
MW158 (-0.039)
MW161 (2.625)
MW166 (0.14)
MW196 (0.31)
MW200 (0.214)
MW171 (0.638)
MW193 (0.55)
MW202 (0.27)
MW203 (0.425)
MW288 (0.311)
MW289 (0.642)
MW233 (0.911)
MW236 (0.692)
MW239 (0.77)
MW243 (0.757)
MW249 (0.657)
MW517 (1.625)
MW256 (0.64)
MW255 (0.619)
MW259 (0.15)
MW010 (0.224)
MW269 (0.133)
MW268 (0.146)
MW228 (0.144)
MW227 (0.154)
MW217 (0.492)
MW214 (0.435)
MW226 (0.033)
MW215 (0.378)
MW282 (0.54)
MW225 (0.216)
Gauging conducted at outgoing tide within 0.1 - 0.3 m of low tide point.
Gauging conducted at high tide 0 - 0.2m from high tide point on 31/08/2021.
Legend
Monitoring Locations RWL (mAHD)
Inferred Groundwater Contours
Management Area
FIGURE 6
1:32,000 Scale at A3
Meters
0
500
1,000
Inferred Groundwater Contours
QUARTERLY SAMPLING EVENT
HMAS STIRLING
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2021-09-21 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0089-GS-006_2021Q3_GroundwaterContours 02.mxd
Aerial Imagery Supplied by Google Earth & Metromap

APPENDIX

B

DATA ASSESSMENT TABLES

Cardno

Table B1 - Groundwater Analytical Results Summary

PFAS OMP Q3 2021 Monitoring Event
HMAS Stirling

				PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - Fluorotelomer Sulfonic Acids			
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting				0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05	0.05	0.05	0.05
PFAS NEMP 2020 Drinking Water														*0.56*										
PFAS NEMP 2020 Interim Marine 99%								0.00023						19										
PFAS NEMP 2020 Recreational Water														**10**										
Location Code	**Date**	**Field ID**	**Lab Report Number**																					
MW010	**31/08/2021**	**0089_MW010_210831**	**EP2110073**	<0.02	<0.02	0.03	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW109	**30/08/2021**	**0089_MW109_210830**	**EP2110020**	0.13	0.28	3.28	0.18	1.59	<0.02	<0.1	0.46	0.09	0.06	0.16	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW112	**30/08/2021**	**0089_MW112_210830**	**EP2110020**	0.08	0.31	7.60	1.14	31.7	<0.02	0.1	1.07	0.32	0.37	*0.94*	<0.02	<0.02	0.03	<0.05	<0.02	<0.02	<0.05	0.05	<0.05	<0.05
MW117	**30/08/2021**	**0089_MW117_210830**	**EP2110020**	0.23	0.51	9.16	2.00	40.6	<0.02	<0.1	1.25	0.18	0.21	*1.12*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW120	**30/08/2021**	**0089_MW120_210830**	**EP2110020**	0.02	0.08	16.8	2.23	0.23	<0.02	<0.1	0.12	<0.02	<0.02	*1.59*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW121	**30/08/2021**	**0089_MW121_210830**	**EP2110020**	0.19	0.48	11.4	1.03	76.5	<0.02	0.1	1.22	0.23	0.27	*1.42*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW123	**30/08/2021**	**0089_MW123_210830**	**EP2110020**	0.08	0.08	0.24	<0.02	0.03	<0.02	<0.1	0.25	0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW124	**30/08/2021**	**0089_MW124_210830**	**EP2110019**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW125	**30/08/2021**	**0089_MW125_210830**	**EP2110019**	0.06	0.07	0.26	<0.02	0.02	<0.02	<0.1	0.05	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW126	**30/08/2021**	**0089_MW126_210830**	**EP2110019**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW127	**30/08/2021**	**0089_MW127_210830**	**EP2110019**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW139	**31/08/2021**	**0089_MW139_210831**	**EP2110071**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW141	**31/08/2021**	**0089_MW141_210831**	**EP2110071**	0.63	2.45	26.2	2.44	89.9	<0.02	0.4	16.1	1.64	0.58	*2.47*	<0.02	<0.02	0.04	<0.05	<0.02	<0.02	<0.05	0.08	<0.05	<0.05
MW142	**30/08/2021**	**0089_MW142_210830**	**EP2110016**	0.06	0.16	3.24	0.11	2.42	<0.02	<0.1	1.35	0.15	0.04	0.24	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW149	**30/08/2021**	**0089_MW149_210830**	**EP2110016**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW158	**30/08/2021**	**0089_MW158_210830**	**EP2110020**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW161	**30/08/2021**	**0089_MW161_210830**	**EP2110020**	0.04	0.02	0.50	0.08	5.09	<0.02	<0.1	0.16	0.20	0.08	0.08	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW166	**30/08/2021**	**0089_MW166_210830**	**EP2110019**	0.03	0.04	0.95	0.22	8.16	<0.02	<0.1	0.26	0.29	0.14	0.09	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW171	**30/08/2021**	**0089_MW171_210830**	**EP2110019**	0.14	0.08	0.35	<0.02	<0.01	<0.02	<0.1	0.19	0.06	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW193	**30/08/2021**	**0089_MW193_210830**	**EP2110020**	1.08	1.31	8.93	0.78	4.45	<0.02	0.3	2.38	0.43	0.22	*0.60*	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW195D	**30/08/2021**	**0089_MW195D_210830**	**EP2110020**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW195S	**30/08/2021**	**0089_MW195S_210830**	**EP2110020**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW196	**30/08/2021**	**0089_MW196_210830**	**EP2110019**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW197	**1/09/2021**	**0089_MW197_210901**	**EP2110159**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW199	**30/08/2021**	**0089_MW199_210830**	**EP2110019**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW200	**1/09/2021**	**0089_MW200_210901**	**EP2110159**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW202	**30/08/2021**	**0089_MW202_210830**	**EP2110019**	<0.02	<0.02	0.04	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW203	**30/08/2021**	**0089_MW203_210830**	**EP2110019**	<0.02	0.02	0.09	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW214	**1/09/2021**	**0089_MW214_210901**	**EP2110159**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW215	**1/09/2021**	**0089_MW215_210901**	**EP2110159**	0.03	0.03	0.35	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW216	**31/08/2021**	**0089_MW216_210831**	**EP2110071**	0.39	0.50	3.45	0.16	1.04	<0.02	1.0	1.98	3.61	0.32	0.30	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	2.71	<0.05	<0.05
MW217	**31/08/2021**	**0089_MW217_210831**	**EP2110064**	0.02	0.02	0.04	<0.02	0.04	<0.02	1.3	7.76	6.95	0.93	0.38	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	38.5	0.24	<0.05
MW224	**31/08/2021**	**0089_MW224_210831**	**EP2110064**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW225	**1/09/2021**	**0089_MW225_210901**	**EP2110160**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW226	**31/08/2021**	**0089_MW226_210831**	**EP2110071**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW227	**31/08/2021**	**0089_MW227_210831**	**EP2110071**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW228	**31/08/2021**	**0089_MW228_210831**	**EP2110071**	0.22	0.15	0.13	<0.02	<0.01	<0.02	2.3	10.4	10.4	2.55	0.03	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.40	<0.05	<0.05
MW288	**31/08/2021**	**0089_MW288_210831**	**EP2110071**	0.16	0.24	0.57	0.03	5.30	<0.02	<0.1	0.26	0.04	<0.02	0.03	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW233	**30/08/2021**	**0089_MW233_210830**	**EP2110016**	<0.02	<0.02	0.07	<0.02	0.34	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW236	**31/08/2021**	**0089_MW236_210831**	**EP2110073**	0.46	2.64	34.8	0.49	26.0	<0.02	0.1	1.67	0.22	0.90	*1.74*	<0.02	<0.02	2.09	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW238	**31/08/2021**	**0089_MW238_210831**	**EP2110073**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW239	**31/08/2021**	**0089_MW239_210831**	**EP2110073**	<0.02	0.03	<0.02	<0.02	<0.01	<0.02	<0.1	0.03	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW240	**31/08/2021**	**0089_MW240_210831**	**EP2110073**	0.02	0.27	4.21	0.06	<0.01	<0.02	<0.1	0.25	0.03	0.06	0.13	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW242	**31/08/2021**	**0089_MW242_210831**	**EP2110073**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW243	**31/08/2021**	**0089_MW243_210831**	**EP2110073**	<0.02	<0.02	0.10	<0.02	0.43	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW245	**31/08/2021**	**0089_MW245_210831**	**EP2110073**	<0.02	<0.02	0.03	<0.02	0.07	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW249	**31/08/2021**	**0089_MW249_210831**	**EP2110071**	<0.02	<0.02	0.13	<0.02	0.14	<0.02	<0.1	0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW255	**31/08/2021**	**0089_MW255_210831**	**EP2110073**	0.12	0.47	6.89	0.02	0.90	<0.02	<0.1	0.44	0.08	0.19	0.03	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW256	**31/08/2021**	**0089_MW256_210831**	**EP2110064**	1.67	0.83	6.42	0.26	12.0	<0.02	0.6	2.34	0.78	0.19	0.45	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	0.25	<0.05	<0.05
MW257	**31/08/2021**	**0089_MW257_210831**	**EP2110073**	<0.02	0.03	0.90	0.10	0.08	<0.02	<0.1	0.06	0.03	0.02	0.12	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW259	**31/08/2021**	**0089_MW259_210831**	**EP2110073**	<0.02	<0.02	0.02	<0.02	0.12	<0.02	<0.1	0.07	0.08	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW261	**31/08/2021**	**0089_MW261_210831**	**EP2110073**	<0.02	<0.02	0.13	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW264	**31/08/2021**	**0089_MW264_210831**	**EP2110073**	<0.02	<0.02	0.10	<0.02	0.44	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW268	**31/08/2021**	**0089_MW268_210831**	**EP2110073**	0.06	0.09	0.41	<0.02	<0.01	<0.02	<0.1	0.04	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW269	**31/08/2021**	**0089_MW269_210831**	**EP2110073**	0.07	0.10	0.59	<0.02	0.41	<0.02	<0.1	0.14	0.03	<0.02	0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW272	**31/08/2021**	**0089_MW272_210831**	**EP2110071**	0.46	1.51	17.4	1.89	68.1	<0.02	0.3	11.4	1.24	0.38	*1.77*	<0.02	<0.02	0.02	<0.05	<0.02	<0.02	<0.05	0.05	<0.05	<0.05
MW282	**31/08/2021**	**0089_MW282_210831**	**EP2110064**	1.68	3.51	34.0	3.93	45.1	<0.02	0.6	7.00	1.05	1.48	*9.37*	<0.02	<0.02	0.03	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW289	**30/08/2021**	**0089_MW289_210830**	**EP2110016**	0.04	0.04	0.25	<0.02	0.76	<0.02	<0.1	0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW516	**31/08/2021**	**0089_MW516_210831**	**EP2110073**	0.15	0.12	1.42	0.09	4.80	<0.02	<0.1	0.06	<0.02	<0.02	0.06	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW517	**31/08/2021**	**0089_MW517_210831**	**EP2110064**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
MW518	**31/08/2021**	**0089_MW518_210831**	**EP2110073**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Drinking Water
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Notes:
First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

	PFAS - Perfluoroalkyl Sulfonamides							PFAS			Metals		
	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Sum of PFAS	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01	1	1	1
PFAS NEMP 2020 Drinking Water									*0.07*				
PFAS NEMP 2020 Interim Marine 99%													
PFAS NEMP 2020 Recreational Water									**2**				
Location Code	**Date**	**Field ID**	**Lab Report Number**										
MW010	**31/08/2021**	**0089_MW010_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06	86	87	41
MW109	**30/08/2021**	**0089_MW109_210830**	**EP2110020**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	5.77	***4.87***	6.23	96	19	2
MW112	**30/08/2021**	**0089_MW112_210830**	**EP2110020**	0.47	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	42.2	***39.3***	44.2	82	10	1
MW117	**30/08/2021**	**0089_MW117_210830**	**EP2110020**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	52.8	***49.8***	55.3	101	14	<1
MW120	**30/08/2021**	**0089_MW120_210830**	**EP2110020**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	18.8	***17.0***	21.1	78	19	3
MW121	**30/08/2021**	**0089_MW121_210830**	**EP2110020**	0.43	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	91.3	***87.9***	93.3	69	11	4
MW123	**30/08/2021**	**0089_MW123_210830**	**EP2110020**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.65	*0.27*	0.73	86	14	2
MW124	**30/08/2021**	**0089_MW124_210830**	**EP2110019**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	440	1,120	405
MW125	**30/08/2021**	**0089_MW125_210830**	**EP2110019**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.39	*0.28*	0.46	476	1,300	459
MW126	**30/08/2021**	**0089_MW126_210830**	**EP2110019**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	454	1,220	403
MW127	**30/08/2021**	**0089_MW127_210830**	**EP2110019**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	408	1,190	398
MW139	**31/08/2021**	**0089_MW139_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	66	8	2
MW141	**31/08/2021**	**0089_MW141_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	138	***116***	143	368	577	203
MW142	**30/08/2021**	**0089_MW142_210830**	**EP2110016**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	7.50	***5.66***	7.77	291	554	196
MW149	**30/08/2021**	**0089_MW149_210830**	**EP2110016**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	404	1,270	518
MW158	**30/08/2021**	**0089_MW158_210830**	**EP2110020**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	206	354	111
MW161	**30/08/2021**	**0089_MW161_210830**	**EP2110020**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	6.15	***5.59***	6.25	122	89	37
MW166	**30/08/2021**	**0089_MW166_210830**	**EP2110019**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	9.92	***9.11***	10.2	132	96	41
MW171	**30/08/2021**	**0089_MW171_210830**	**EP2110019**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.74	*0.35*	0.82	195	381	104
MW193	**30/08/2021**	**0089_MW193_210830**	**EP2110020**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	18.4	***13.4***	20.5	119	73	27
MW195D	**30/08/2021**	**0089_MW195D_210830**	**EP2110020**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	365	785	297
MW195S	**30/08/2021**	**0089_MW195S_210830**	**EP2110020**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	203	167	56
MW196	**30/08/2021**	**0089_MW196_210830**	**EP2110019**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	73	20	2
MW197	**1/09/2021**	**0089_MW197_210901**	**EP2110159**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	67	324	91
MW199	**30/08/2021**	**0089_MW199_210830**	**EP2110019**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	70	46	10
MW200	**1/09/2021**	**0089_MW200_210901**	**EP2110159**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	104	119	74
MW202	**30/08/2021**	**0089_MW202_210830**	**EP2110019**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.08	*0.08*	0.08	100	22	12
MW203	**30/08/2021**	**0089_MW203_210830**	**EP2110019**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	*0.09*	0.11	75	37	4
MW214	**1/09/2021**	**0089_MW214_210901**	**EP2110159**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	206	52	9
MW215	**1/09/2021**	**0089_MW215_210901**	**EP2110159**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.38	*0.35*	0.41	116	27	5
MW216	**31/08/2021**	**0089_MW216_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	14.8	***4.49***	15.5	128	38	7
MW217	**31/08/2021**	**0089_MW217_210831**	**EP2110064**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	56.2	*0.08*	56.2	104	11	6
MW224	**31/08/2021**	**0089_MW224_210831**	**EP2110064**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	56	21	4
MW225	**1/09/2021**	**0089_MW225_210901**	**EP2110160**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	134	39	8
MW226	**31/08/2021**	**0089_MW226_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	388	1,080	450
MW227	**31/08/2021**	**0089_MW227_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	142	83	40
MW228	**31/08/2021**	**0089_MW228_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	26.4	*0.13*	26.6	215	536	202
MW288	**31/08/2021**	**0089_MW288_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	6.36	***5.87***	6.63	76	21	6
MW233	**30/08/2021**	**0089_MW233_210830**	**EP2110016**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.41	*0.41*	0.41	40	5	3
MW236	**31/08/2021**	**0089_MW236_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	65.9	***60.8***	71.1	105	19	2
MW238	**31/08/2021**	**0089_MW238_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	88	14	2
MW239	**31/08/2021**	**0089_MW239_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	<0.01	0.06	78	14	3
MW240	**31/08/2021**	**0089_MW240_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	4.70	***4.21***	5.03	122	12	4
MW242	**31/08/2021**	**0089_MW242_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	97	22	5
MW243	**31/08/2021**	**0089_MW243_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.53	*0.53*	0.53	112	15	6
MW245	**31/08/2021**	**0089_MW245_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.10	*0.10*	0.10	118	14	2
MW249	**31/08/2021**	**0089_MW249_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.29	*0.27*	0.29	119	40	3
MW255	**31/08/2021**	**0089_MW255_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	8.65	***7.79***	9.14	106	27	3
MW256	**31/08/2021**	**0089_MW256_210831**	**EP2110064**	0.07	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	24.7	***18.4***	25.9	149	27	9
MW257	**31/08/2021**	**0089_MW257_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.21	*0.98*	1.34	41	4	3
MW259	**31/08/2021**	**0089_MW259_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.29	*0.14*	0.29	70	11	2
MW261	**31/08/2021**	**0089_MW261_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.13	*0.13*	0.13	134	42	22
MW264	**31/08/2021**	**0089_MW264_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.54	*0.54*	0.54	122	45	11
MW268	**31/08/2021**	**0089_MW268_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.51	*0.41*	0.60	205	211	50
MW269	**31/08/2021**	**0089_MW269_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.25	*1.00*	1.35	77	58	18
MW272	**31/08/2021**	**0089_MW272_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	101	***85.5***	104	371	720	252
MW282	**31/08/2021**	**0089_MW282_210831**	**EP2110064**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	100	***79.1***	108	148	20	<1
MW289	**30/08/2021**	**0089_MW289_210830**	**EP2110016**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.07	*1.01*	1.11	119	27	4
MW516	**31/08/2021**	**0089_MW516_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	6.49	***6.22***	6.70	225	58	23
MW517	**31/08/2021**	**0089_MW517_210831**	**EP2110064**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	81	17	5
MW518	**31/08/2021**	**0089_MW518_210831**	**EP2110073**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	123	61	18

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Drinking Water
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Notes:
First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

Cardno

Table B2 - Porewater Analytical Results Summary

PFAS OMP Q3 2021 Monitoring Event
HMAS Stirling

				PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - Fluorotelomer Sulfonic Acids			
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting				0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05	0.05	0.05	0.05
PFAS NEMP 2020 Drinking Water														*0.56*										
PFAS NEMP 2020 Interim Marine 99%								0.00023						19										
PFAS NEMP 2020 Recreational Water														**10**										
Location Code	**Date**	**Field ID**	**Lab Report Number**																					
PW304	**1/09/2021**	**0089_PW304_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW306	**31/08/2021**	**0089_PW306_210831**	**EP2110072**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW307	**31/08/2021**	**0089_PW307_210831**	**EP2110065**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW308	**31/08/2021**	**0089_PW308_210831**	**EP2110072**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW314	**31/08/2021**	**0089_PW314_210831**	**EP2110065**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW315	**31/08/2021**	**0089_PW315_210831**	**EP2110072**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW316	**31/08/2021**	**0089_PW316_210831**	**EP2110065**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW329	**30/08/2021**	**0089_PW329_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW330	**30/08/2021**	**0089_PW330_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW331	**30/08/2021**	**0089_PW331_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW335	**30/08/2021**	**0089_PW335_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW340	**30/08/2021**	**0089_PW340_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW341	**30/08/2021**	**0089_PW341_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW345	**1/09/2021**	**0089_PW345_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW346	**30/08/2021**	**0089_PW346_210830**	**EP2110017**	<0.02	<0.02	0.05	<0.02	0.34	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW350	**30/08/2021**	**0089_PW350_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW351	**30/08/2021**	**0089_PW351_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW352	**30/08/2021**	**0089_PW352_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW356	**30/08/2021**	**0089_PW356_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW357	**30/08/2021**	**0089_PW357_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW358	**30/08/2021**	**0089_PW358_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW362	**30/08/2021**	**0089_PW362_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW363	**30/08/2021**	**0089_PW363_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW364	**30/08/2021**	**0089_PW364_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW367	**1/09/2021**	**0089_PW367_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW368	**1/09/2021**	**0089_PW368_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW369	**1/09/2021**	**0089_PW369_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW374	**1/09/2021**	**0089_PW374_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW375	**1/09/2021**	**0089_PW375_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW378	**1/09/2021**	**0089_PW378_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW380	**30/08/2021**	**0089_PW380_210830**	**EP2110017**	<0.02	<0.02	0.06	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW381	**30/08/2021**	**0089_PW381_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW401	**30/08/2021**	**0089_PW401_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW405	**31/08/2021**	**0089_PW405_210831**	**EP2110065**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	0.02	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW407	**31/08/2021**	**0089_PW407_210831**	**EP2110065**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW409	**31/08/2021**	**0089_PW409_210831**	**EP2110065**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW411	**1/09/2021**	**0089_PW411_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW413	**1/09/2021**	**0089_PW413_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
PW415	**1/09/2021**	**0089_PW415_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Drinking Water
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Notes:
First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

				PFAS - Perfluoroalkyl Sulfonamides							PFAS			Metals		
				Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Sum of PFAS	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting				0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01	1	1	1
PFAS NEMP 2020 Drinking Water												*0.07*				
PFAS NEMP 2020 Interim Marine 99%																
PFAS NEMP 2020 Recreational Water												**2**				
Location Code	**Date**	**Field ID**	**Lab Report Number**													
PW304	**1/09/2021**	**0089_PW304_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	437	1,270	521
PW306	**31/08/2021**	**0089_PW306_210831**	**EP2110072**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	452	1,410	563
PW307	**31/08/2021**	**0089_PW307_210831**	**EP2110065**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	406	1,320	526
PW308	**31/08/2021**	**0089_PW308_210831**	**EP2110072**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	486	1,540	625
PW314	**31/08/2021**	**0089_PW314_210831**	**EP2110065**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	402	1,320	521
PW315	**31/08/2021**	**0089_PW315_210831**	**EP2110072**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	471	1,490	600
PW316	**31/08/2021**	**0089_PW316_210831**	**EP2110065**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	410	1,330	529
PW329	**30/08/2021**	**0089_PW329_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	450	1,350	600
PW330	**30/08/2021**	**0089_PW330_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	443	1,330	591
PW331	**30/08/2021**	**0089_PW331_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	443	1,350	599
PW335	**30/08/2021**	**0089_PW335_210830**	**EP2110021**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	409	1,260	564
PW340	**30/08/2021**	**0089_PW340_210830**	**EP2110021**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	406	1,250	558
PW341	**30/08/2021**	**0089_PW341_210830**	**EP2110021**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	406	1,240	556
PW345	**1/09/2021**	**0089_PW345_210901**	**EP2110154**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	371	1,080	458
PW346	**30/08/2021**	**0089_PW346_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.39	*0.39*	0.39	429	1,290	569
PW350	**30/08/2021**	**0089_PW350_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	431	1,340	595
PW351	**30/08/2021**	**0089_PW351_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	429	1,340	595
PW352	**30/08/2021**	**0089_PW352_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	433	1,340	594
PW356	**30/08/2021**	**0089_PW356_210830**	**EP2110021**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	443	1,310	582
PW357	**30/08/2021**	**0089_PW357_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	425	1,300	572
PW358	**30/08/2021**	**0089_PW358_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	457	1,380	614
PW362	**30/08/2021**	**0089_PW362_210830**	**EP2110021**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	425	1,320	586
PW363	**30/08/2021**	**0089_PW363_210830**	**EP2110021**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	415	1,280	573
PW364	**30/08/2021**	**0089_PW364_210830**	**EP2110021**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	408	1,270	567
PW367	**1/09/2021**	**0089_PW367_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	482	1,320	552
PW368	**1/09/2021**	**0089_PW368_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	458	1,460	599
PW369	**1/09/2021**	**0089_PW369_210901**	**EP2110154**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	208	594	269
PW374	**1/09/2021**	**0089_PW374_210901**	**EP2110154**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	436	1,390	566
PW375	**1/09/2021**	**0089_PW375_210901**	**EP2110154**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05	460	1,480	603
PW378	**1/09/2021**	**0089_PW378_210901**	**EP2110154**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	453	1,460	598
PW380	**30/08/2021**	**0089_PW380_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.14	*0.14*	0.14	429	1,340	592
PW381	**30/08/2021**	**0089_PW381_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	462	1,430	631
PW401	**30/08/2021**	**0089_PW401_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	453	1,400	617
PW405	**31/08/2021**	**0089_PW405_210831**	**EP2110065**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	<0.01	0.04	407	1,310	515
PW407	**31/08/2021**	**0089_PW407_210831**	**EP2110065**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	408	1,310	521
PW409	**31/08/2021**	**0089_PW409_210831**	**EP2110065**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	414	1,320	521
PW411	**1/09/2021**	**0089_PW411_210901**	**EP2110154**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	456	1,460	604
PW413	**1/09/2021**	**0089_PW413_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	434	1,400	575
PW415	**1/09/2021**	**0089_PW415_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	447	1,430	592

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Drinking Water
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Notes:
First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

				PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - Fluorotelomer Sulfonic Acids			
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting				0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05	0.05	0.05	0.05
PFAS NEMP 2020 Drinking Water														*0.56*										
PFAS NEMP 2020 Interim Marine 99%								0.00023						19										
PFAS NEMP 2020 Recreational Water														**10**										
Location Code	**Date**	**Field ID**	**Lab Report Number**																					
SW130	**30/08/2021**	**0089_SW130_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW132	**30/08/2021**	**0089_SW132_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW134	**30/08/2021**	**0089_SW134_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW150	**30/08/2021**	**0089_SW150_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW152	**30/08/2021**	**0089_SW152_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW154	**30/08/2021**	**0089_SW154_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW156	**30/08/2021**	**0089_SW156_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW305	**1/09/2021**	**0089_SW305_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW309	**31/08/2021**	**0089_SW309_210831**	**EP2110065**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW310	**31/08/2021**	**0089_SW310_210831**	**EP2110065**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW311	**31/08/2021**	**0089_SW311_210831**	**EP2110072**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW317	**31/08/2021**	**0089_SW317_210831**	**EP2110068**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW318	**31/08/2021**	**0089_SW318_210831**	**EP2110068**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW319	**31/08/2021**	**0089_SW319_210831**	**EP2110068**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW353	**30/08/2021**	**0089_SW353_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW370	**1/09/2021**	**0089_SW370_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW371	**1/09/2021**	**0089_SW371_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW372	**1/09/2021**	**0089_SW372_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW373	**30/08/2021**	**0089_SW373_210830**	**EP2110017**	<0.02	<0.02	0.03	<0.02	0.37	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW382	**30/08/2021**	**0089_SW382_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	0.17	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW383	**30/08/2021**	**0089_SW383_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW384	**30/08/2021**	**0089_SW384_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW406	**31/08/2021**	**0089_SW406_210831**	**EP2110065**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	0.08	0.08	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW408	**31/08/2021**	**0089_SW408_210831**	**EP2110072**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	0.03	0.03	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW410	**31/08/2021**	**0089_SW410_210831**	**EP2110065**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW412	**1/09/2021**	**0089_SW412_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW414	**1/09/2021**	**0089_SW414_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
SW416	**1/09/2021**	**0089_SW416_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Drinking Water
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Notes:
First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

				PFAS - Perfluoroalkyl Sulfonamides							PFAS			Metals		
				Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Sum of PFAS	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting				0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01	1	1	1
PFAS NEMP 2020 Drinking Water												*0.07*				
PFAS NEMP 2020 Interim Marine 99%																
PFAS NEMP 2020 Recreational Water												**2**				
Location Code	**Date**	**Field ID**	**Lab Report Number**													
SW130	**30/08/2021**	**0089_SW130_210830**	**EP2110021**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	424	1,310	584
SW132	**30/08/2021**	**0089_SW132_210830**	**EP2110021**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	420	1,300	578
SW134	**30/08/2021**	**0089_SW134_210830**	**EP2110021**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	435	1,350	600
SW150	**30/08/2021**	**0089_SW150_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	445	1,370	606
SW152	**30/08/2021**	**0089_SW152_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	417	1,300	577
SW154	**30/08/2021**	**0089_SW154_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	406	1,270	566
SW156	**30/08/2021**	**0089_SW156_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	414	1,300	576
SW305	**1/09/2021**	**0089_SW305_210901**	**EP2110154**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	422	1,340	546
SW309	**31/08/2021**	**0089_SW309_210831**	**EP2110065**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	400	1,300	517
SW310	**31/08/2021**	**0089_SW310_210831**	**EP2110065**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	406	1,320	522
SW311	**31/08/2021**	**0089_SW311_210831**	**EP2110072**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	430	1,380	559
SW317	**31/08/2021**	**0089_SW317_210831**	**EP2110068**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	454	1,400	582
SW318	**31/08/2021**	**0089_SW318_210831**	**EP2110068**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	435	1,350	551
SW319	**31/08/2021**	**0089_SW319_210831**	**EP2110068**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	420	1,300	536
SW353	**30/08/2021**	**0089_SW353_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	424	1,320	586
SW370	**1/09/2021**	**0089_SW370_210901**	**EP2110154**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	440	1,400	572
SW371	**1/09/2021**	**0089_SW371_210901**	**EP2110154**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	433	1,390	567
SW372	**1/09/2021**	**0089_SW372_210901**	**EP2110154**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	445	1,420	580
SW373	**30/08/2021**	**0089_SW373_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.40	*0.40*	0.40	412	1,270	559
SW382	**30/08/2021**	**0089_SW382_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.17	*0.17*	0.17	434	1,350	600
SW383	**30/08/2021**	**0089_SW383_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	420	1,310	583
SW384	**30/08/2021**	**0089_SW384_210830**	**EP2110017**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	421	1,320	586
SW406	**31/08/2021**	**0089_SW406_210831**	**EP2110065**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.16	<0.01	0.16	406	1,310	518
SW408	**31/08/2021**	**0089_SW408_210831**	**EP2110072**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	<0.01	0.06	478	1,490	600
SW410	**31/08/2021**	**0089_SW410_210831**	**EP2110065**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	412	1,310	522
SW412	**1/09/2021**	**0089_SW412_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	437	1,410	578
SW414	**1/09/2021**	**0089_SW414_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	433	1,400	572
SW416	**1/09/2021**	**0089_SW416_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	424	1,360	548

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Drinking Water
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Notes:
First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

Table B4 - Sediment Analytical Results Summary

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - Fluorotelomer Sulfonic Acids			
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005
PFAS NEMP 2020 Ecological direct exposure					**1**						**10**										
PFAS NEMP 2020 Ecological indirect exposure					*0.01*																
PFAS NEMP 2020 Industrial/ commercial (HIL D)											50										

Location Code	Date	Field ID	Lab Report Number																			
SD304	1/09/2021	0089_SD304_210901	EP2110157	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD306	31/08/2021	0089_SD306_210831	EP2110074	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD307	31/08/2021	0089_SD307_210831	EP2110067	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD308	31/08/2021	0089_SD308_210831	EP2110074	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD314	31/08/2021	0089_SD314_210831	EP2110067	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD315	31/08/2021	0089_SD315_210831	EP2110074	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD316	31/08/2021	0089_SD316_210831	EP2110067	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD329	30/08/2021	0089_SD329_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD330	30/08/2021	0089_SD330_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD331	30/08/2021	0089_SD331_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD335	30/08/2021	0089_SD335_210830	EP2110022	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD340	30/08/2021	0089_SD340_210830	EP2110023	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD341	30/08/2021	0089_SD341_210830	EP2110022	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD345	1/09/2021	0089_SD345_210901	EP2110156	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD346	30/08/2021	0089_SD346_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	0.0024	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD350	30/08/2021	0089_SD350_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD351	30/08/2021	0089_SD351_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD352	30/08/2021	0089_SD352_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD356	30/08/2021	0089_SD356_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD357	30/08/2021	0089_SD357_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD358	30/08/2021	0089_SD358_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD362	30/08/2021	0089_SD362_210830	EP2110023	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD363	30/08/2021	0089_SD363_210830	EP2110023	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD364	30/08/2021	0089_SD364_210830	EP2110022	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD367	1/09/2021	0089_SD367_210901	EP2110156	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD368	1/09/2021	0089_SD368_210901	EP2110157	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD369	1/09/2021	0089_SD369_210901	EP2110156	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD374	1/09/2021	0089_SD374_210901	EP2110156	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD375	1/09/2021	0089_SD375_210901	EP2110156	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD378	1/09/2021	0089_SD378_210901	EP2110156	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD380	30/08/2021	0089_SD380_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD381	30/08/2021	0089_SD381_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD401	30/08/2021	0089_SD401_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD405	31/08/2021	0089_SD405_210831	EP2110067	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD407	31/08/2021	0089_SD407_210831	EP2110067	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD409	31/08/2021	0089_SD409_210831	EP2110067	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD411	1/09/2021	0089_SD411_210901	EP2110156	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD413	1/09/2021	0089_SD413_210901	EP2110157	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SD415	1/09/2021	0089_SD415_210901	EP2110157	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Ecological direct exposure
HEPA, January 2020, PFAS NEMP 2020 Ecological indirect exposure
HEPA, January 2020, PFAS NEMP 2020 Industrial/ commercial (HIL D)

Notes:

First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
				Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Sum of PFAS
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting				0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure													
PFAS NEMP 2020 Ecological indirect exposure													
PFAS NEMP 2020 Industrial/ commercial (HIL D)												20	
Location Code	**Date**	**Field ID**	**Lab Report Number**										
SD304	**1/09/2021**	**0089_SD304_210901**	**EP2110157**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD306	**31/08/2021**	**0089_SD306_210831**	**EP2110074**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD307	**31/08/2021**	**0089_SD307_210831**	**EP2110067**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD308	**31/08/2021**	**0089_SD308_210831**	**EP2110074**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD314	**31/08/2021**	**0089_SD314_210831**	**EP2110067**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD315	**31/08/2021**	**0089_SD315_210831**	**EP2110074**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD316	**31/08/2021**	**0089_SD316_210831**	**EP2110067**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD329	**30/08/2021**	**0089_SD329_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD330	**30/08/2021**	**0089_SD330_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD331	**30/08/2021**	**0089_SD331_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD335	**30/08/2021**	**0089_SD335_210830**	**EP2110022**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD340	**30/08/2021**	**0089_SD340_210830**	**EP2110023**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD341	**30/08/2021**	**0089_SD341_210830**	**EP2110022**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD345	**1/09/2021**	**0089_SD345_210901**	**EP2110156**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD346	**30/08/2021**	**0089_SD346_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0024	0.0024	0.0024
SD350	**30/08/2021**	**0089_SD350_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002	0.0002
SD351	**30/08/2021**	**0089_SD351_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD352	**30/08/2021**	**0089_SD352_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD356	**30/08/2021**	**0089_SD356_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD357	**30/08/2021**	**0089_SD357_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD358	**30/08/2021**	**0089_SD358_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD362	**30/08/2021**	**0089_SD362_210830**	**EP2110023**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD363	**30/08/2021**	**0089_SD363_210830**	**EP2110023**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD364	**30/08/2021**	**0089_SD364_210830**	**EP2110022**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD367	**1/09/2021**	**0089_SD367_210901**	**EP2110156**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD368	**1/09/2021**	**0089_SD368_210901**	**EP2110157**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006	0.0006
SD369	**1/09/2021**	**0089_SD369_210901**	**EP2110156**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD374	**1/09/2021**	**0089_SD374_210901**	**EP2110156**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD375	**1/09/2021**	**0089_SD375_210901**	**EP2110156**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
SD378	**1/09/2021**	**0089_SD378_210901**	**EP2110156**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0005	0.0005
SD380	**30/08/2021**	**0089_SD380_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD381	**30/08/2021**	**0089_SD381_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD401	**30/08/2021**	**0089_SD401_210830**	**EP2110018**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD405	**31/08/2021**	**0089_SD405_210831**	**EP2110067**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD407	**31/08/2021**	**0089_SD407_210831**	**EP2110067**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD409	**31/08/2021**	**0089_SD409_210831**	**EP2110067**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD411	**1/09/2021**	**0089_SD411_210901**	**EP2110156**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD413	**1/09/2021**	**0089_SD413_210901**	**EP2110157**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD415	**1/09/2021**	**0089_SD415_210901**	**EP2110157**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Ecological direct exposure
HEPA, January 2020, PFAS NEMP 2020 Ecological indirect exposure
HEPA, January 2020, PFAS NEMP 2020 Industrial/ commercial (HIL D)

Notes:

First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

Table B5 - Rinsate Results Summary

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - Fluorotelomer Sulfonic Acids			
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluorohexanoic acid (PFHxA)	Perfluoropentanoic acid (PFPeA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.05	0.02	0.02	0.05	0.05	0.05	0.05
PFAS NEMP 2020 Drinking Water											*0.56*										
PFAS NEMP 2020 Interim Marine 99%					0.00023						19										
PFAS NEMP 2020 Recreational Water											**10**										
Sample Type	**Date**	**Field ID**	**Lab Report Number**																			
Rinsate	**30/08/2021**	**0089_QC301_210830**	**EP2110016**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Rinsate	**30/08/2021**	**0089_QC302_210830**	**EP2110016**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Rinsate	**30/08/2021**	**0089_QC303_210830**	**EP2110016**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Field Blank	**30/08/2021**	**0089_QC401_210830**	**EP2110016**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Field Blank	**30/08/2021**	**0089_QC402_210830**	**EP2110016**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Field Blank	**30/08/2021**	**0089_QC403_210830**	**EP2110016**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Rinsate	**31/08/2021**	**0089_QC301_210831**	**EP2110071**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Rinsate	**31/08/2021**	**0089_QC302_210831**	**EP2110071**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Rinsate	**31/08/2021**	**0089_QC303_210831**	**EP2110071**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Field Blank	**31/08/2021**	**0089_QC401_210831**	**EP2110064**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Field Blank	**31/08/2021**	**0089_QC402_210831**	**EP2110064**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Field Blank	**31/08/2021**	**0089_QC403_210831**	**EP2110064**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Rinsate	**1/09/2021**	**0089_QC301_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Rinsate	**1/09/2021**	**0089_QC302_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Field Blank	**1/09/2021**	**0089_QC401_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05
Field Blank	**1/09/2021**	**0089_QC402_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05

Table B5 - Rinsate Results Summary

	PFAS - Perfluoroalkyl Sulfonamides							PFAS		
	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Sum of PFAS
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01
PFAS NEMP 2020 Drinking Water									*0.07*	
PFAS NEMP 2020 Interim Marine 99%										
PFAS NEMP 2020 Recreational Water									**2**	

Sample Type	Date	Field ID	Lab Report Number										
Rinsate	**30/08/2021**	**0089_QC301_210830**	**EP2110016**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Rinsate	**30/08/2021**	**0089_QC302_210830**	**EP2110016**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Rinsate	**30/08/2021**	**0089_QC303_210830**	**EP2110016**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Field Blank	**30/08/2021**	**0089_QC401_210830**	**EP2110016**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Field Blank	**30/08/2021**	**0089_QC402_210830**	**EP2110016**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Field Blank	**30/08/2021**	**0089_QC403_210830**	**EP2110016**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Rinsate	**31/08/2021**	**0089_QC301_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Rinsate	**31/08/2021**	**0089_QC302_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Rinsate	**31/08/2021**	**0089_QC303_210831**	**EP2110071**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Field Blank	**31/08/2021**	**0089_QC401_210831**	**EP2110064**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Field Blank	**31/08/2021**	**0089_QC402_210831**	**EP2110064**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Field Blank	**31/08/2021**	**0089_QC403_210831**	**EP2110064**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Rinsate	**1/09/2021**	**0089_QC301_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Rinsate	**1/09/2021**	**0089_QC302_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Field Blank	**1/09/2021**	**0089_QC401_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Field Blank	**1/09/2021**	**0089_QC402_210901**	**EP2110155**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01

Date			30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021	
Field ID			0089_MW233_210830	0089_QC102_210830		0089_MW233_210830	0089_QC202_210830		0089_MW125_210830	0089_QC101_210830		0089_MW125_210830	0089_QC201_210830		0089_MW289_210830	0089_QC103_210830		0089_MW289_210830	0089_QC203_210830	
Matrix Type			Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water	
Lab Report Number			EP2110016	EP2110016	RPD	EP2110016	820919	RPD	EP2110019	EP2110019	RPD	EP2110019	820919	RPD	EP2110016	EP2110016	RPD	EP2110016	820919	RPD
	Unit	LOR																		
PFAS - Perfluoroalkyl Sulfonic Acids																				
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01					<0.01						0.02						<0.01	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.06	0.06	0	0.06	0.05	18	0.04	0.04	0	0.04	0.02	67
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.07	0.07	0	0.07	0.05	33	0.04	0.04	0	0.04	0.03	29
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	0.07	0.10	35	0.07	0.06	15	0.26	0.26	0	0.26	0.25	4	0.25	0.24	4	0.25	0.19	27
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	0.02	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.34	0.27	**23**	0.34	0.28	19	0.02	0.02	0	0.02	0.02	0	0.76	0.76	0	0.76	0.65	16
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01					<0.01						<0.01						<0.01	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.1	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	0.02	0	<0.02	<0.1	0	0.05	0.05	0	0.05	0.04	22	0.02	0.02	0	0.02	<0.1	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.1	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.1	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.1	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.1	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0
PFAS - Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.1	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.1	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.1	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.1	0
PFAS - Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.1	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.1	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.1	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS																				
Sum of PFAS (WA DER List)	µg/L	0.01	0.41	0.39	5	0.41	0.34	19	0.39	0.39	0	0.39	0.36	8	1.07	1.06	1	1.07	0.86	**22**
Sum of PFHxS and PFOS	µg/L	0.01	0.41	0.37	10	0.41	0.34	19	0.28	0.28	0	0.28	0.27	4	1.01	1.00	1	1.01	0.84	18
Sum of PFAS	µg/L	0.01	0.41	0.39	5	0.41	0.34	19	0.46	0.46	0	0.46	0.43	7	1.11	1.10	1	1.11	0.91	20
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01					0.34						0.27						0.84	
Sum of PFAS (PFOS + PFOA)	µg/L	0.01					0.28						0.02						0.65	
Metals																				
Calcium (filtered)	mg/L	1	40	47	16	40			476	469	1	476			119	109	9	119		
Magnesium (filtered)	mg/L	1	5	6	18	5			1,300	1,260	3	1,300			27	25	8	27		
Potassium (filtered)	mg/L	1	3	3	0	3			459	448	2	459			4	5	22	4		

**RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: No Limit (1 - 10 x EQL); 50 (10 - 20 x EQL); 20 (> 20 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021
		0089_SW134_210830	0089_QC104_210830		0089_SW134_210830	0089_QC204_210830		0089_PW364_210830	0089_QC106_210830		0089_PW364_210830	0089_QC206_210830		0089_SW150_210830	0089_QC108_210830		0089_SW150_210830	0089_QC208_210830		0089_MW158_210830
		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water
		EP2110021	EP2110021	RPD	EP2110021	820919	RPD	EP2110021	EP2110021	RPD	EP2110021	820919	RPD	EP2110017	EP2110017	RPD	EP2110017	820919	RPD	EP2110020
	Unit																			
PFAS - Perfluoroalkyl Sulfonic Acids																				
Perfluoropropanesulfonic acid (PFPrS)	µg/L					<0.01						<0.01						<0.01		
Perfluorobutane sulfonic acid (PFBS)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
Perfluoropentane sulfonic acid (PFPeS)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
Perfluorohexane sulfonic acid (PFHxS)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
Perfluorooctane sulfonic acid (PFOS)	µg/L	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01
Perfluorononanesulfonic acid (PFNS)	µg/L					<0.01						<0.01						<0.01		
Perfluorodecane sulfonic acid (PFDS)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
PFAS - Perfluoroalkyl Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	µg/L	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	<0.1
Perfluorohexanoic acid (PFHxA)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
Perfluoropentanoic acid (PFPeA)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
Perfluoroheptanoic acid (PFHpA)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
Perfluorooctanoic acid (PFOA)	µg/L	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01
Perfluorodecanoic acid (PFDA)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
Perfluorododecanoic acid (PFDoDA)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
Perfluorononanoic acid (PFNA)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
Perfluorotetradecanoic acid (PFTeDA)	µg/L	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05
Perfluorotridecanoic acid (PFTrDA)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
Perfluoroundecanoic acid (PFUnDA)	µg/L	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02
PFAS - Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05
PFAS - Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	µg/L	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
PFAS																				
Sum of PFAS (WA DER List)	µg/L	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0	<0.01
Sum of PFHxS and PFOS	µg/L	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01
Sum of PFAS	µg/L	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0	<0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L					<0.01						<0.01						<0.01		
Sum of PFAS (PFOS + PFOA)	µg/L					<0.01						<0.01						<0.01		
Metals																				
Calcium (filtered)	mg/L	435	430	1	435			408	414	1	408			445	420	6	445			206
Magnesium (filtered)	mg/L	1,350	1,330	1	1,350			1,270	1,290	2	1,270			1,370	1,290	6	1,370			354
Potassium (filtered)	mg/L	600	595	1	600			567	577	2	567			606	574	5	606			111

*RPDs have only been considered where a concentration
**Elevated RPDs are highlighted as per QAQC Profile sett
***Interlab Duplicates are matched on a per compound l

		30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021
		0089_QC110_210830		0089_MW158_210830	0089_QC210_210830		0089_MW195D_210830	0089_QC111_210830		0089_MW195D_210830	0089_QC211_210830		0089_MW196_210830	0089_QC112_210830		0089_MW196_210830	0089_QC212_210830		0089_MW193_210830	0089_QC113_210830
		Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water
		EP2110020	RPD	EP2110020	820919	RPD	EP2110020	EP2110020	RPD	EP2110020	820919	RPD	EP2110019	EP2110019	RPD	EP2110019	820919	RPD	EP2110020	EP2110020
	Unit																			
PFAS - Perfluoroalkyl Sulfonic Acids																				
Perfluoropropanesulfonic acid (PFPrS)	µg/L				<0.01						<0.01						<0.01			
Perfluorobutane sulfonic acid (PFBS)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	1.08	1.07
Perfluoropentane sulfonic acid (PFPeS)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	1.31	1.21
Perfluorohexane sulfonic acid (PFHxS)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	0.02	0	<0.02	<0.02	0	<0.02	<0.01	0	8.93	8.17
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	0.78	0.80
Perfluorooctane sulfonic acid (PFOS)	µg/L	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	4.45	3.75
Perfluorononanesulfonic acid (PFNS)	µg/L				<0.01						<0.01						<0.01			
Perfluorodecane sulfonic acid (PFDS)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02
PFAS - Perfluoroalkyl Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	µg/L	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.1	0	0.3	0.2
Perfluorohexanoic acid (PFHxA)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0	2.38	2.36
Perfluoropentanoic acid (PFPeA)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0	0.43	0.42
Perfluoroheptanoic acid (PFHpA)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0	0.22	0.22
Perfluorooctanoic acid (PFOA)	µg/L	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.1	0	0.60	0.60
Perfluorodecanoic acid (PFDA)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0	<0.02	<0.02
Perfluorononanoic acid (PFNA)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	µg/L	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05
Perfluorotridecanoic acid (PFTrDA)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	µg/L	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.1	0	<0.02	<0.02
PFAS - Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	0.06
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05
PFAS - Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	µg/L	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.1	0	<0.02	<0.02
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.1	0	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05
PFAS																				
Sum of PFAS (WA DER List)	µg/L	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.1	0	18.4	16.8
Sum of PFHxS and PFOS	µg/L	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	0.02	67	<0.01	<0.01	0	<0.01	<0.01	0	13.4	11.9
Sum of PFAS	µg/L	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0	20.5	18.9
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L				<0.01						0.02						<0.1			
Sum of PFAS (PFOS + PFOA)	µg/L				<0.01						<0.01						<0.1			
Metals																				
Calcium (filtered)	mg/L	207	0	206			365	356	2	365			73	70	4	73			119	120
Magnesium (filtered)	mg/L	356	1	354			785	764	3	785			20	20	0	20			73	72
Potassium (filtered)	mg/L	111	0	111			297	292	2	297			2	2	0	2			27	27

*RPDs have only been considered where a concentration
**Elevated RPDs are highlighted as per QAQC Profile sett
***Interlab Duplicates are matched on a per compound l

			30/08/2021	30/08/2021		31/08/2021	31/08/2021		31/08/2021	31/08/2021		31/08/2021	31/08/2021		31/08/2021	31/08/2021		31/08/2021	31/08/2021		31/08/2021
			0089_MW193_210830	0089_QC213_210830		0089_SW309_210831	0089_QC114_210831		0089_SW309_210831	0089_QC214_210831		0089_PW315_210831	0089_QC116_210831		0089_PW315_210831	0089_QC216_210831		0089_PW405_210831	0089_QC117_210831		0089_PW405_210831
		RPD	Water EP2110020	Water 820919	RPD	Water EP2110065	Water EP2110065	RPD	Water EP2110065	Water 821197	RPD	Water EP2110072	Water EP2110072	RPD	Water EP2110072	Water 821197	RPD	Water EP2110065	Water EP2110065	RPD	Water EP2110065
	Unit																				
PFAS - Perfluoroalkyl Sulfonic Acids																					
Perfluoropropanesulfonic acid (PFPrS)	µg/L			0.60						<0.01						<0.01					
Perfluorobutane sulfonic acid (PFBS)	µg/L	1	1.08	1.0	8	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02
Perfluoropentane sulfonic acid (PFPeS)	µg/L	8	1.31	0.75	**54**	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02
Perfluorohexane sulfonic acid (PFHxS)	µg/L	9	8.93	7.6	16	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	3	0.78	0.81	4	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02
Perfluorooctane sulfonic acid (PFOS)	µg/L	17	4.45	5.4	19	<0.01	<0.01	0	<0.01	<0.01	0	0.01	0.01	0	0.01	<0.01	0	<0.01	<0.01	0	<0.01
Perfluorononanesulfonic acid (PFNS)	µg/L			<0.01						<0.01						<0.01					
Perfluorodecane sulfonic acid (PFDS)	µg/L	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02
PFAS - Perfluoroalkyl Carboxylic Acids																					
Perfluorobutanoic acid (PFBA)	µg/L	40	0.3	0.24	22	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1
Perfluorohexanoic acid (PFHxA)	µg/L	1	2.38	2.7	13	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	0.02	0.02	0	0.02
Perfluoropentanoic acid (PFPeA)	µg/L	2	0.43	0.45	5	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	0.02	<0.02	0	0.02
Perfluoroheptanoic acid (PFHpA)	µg/L	0	0.22	0.23	4	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02
Perfluorooctanoic acid (PFOA)	µg/L	0	0.60	0.64	6	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01
Perfluorodecanoic acid (PFDA)	µg/L	0	<0.02	<0.1	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02
Perfluorododecanoic acid (PFDoDA)	µg/L	0	<0.02	<0.1	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02
Perfluorononanoic acid (PFNA)	µg/L	0	<0.02	<0.1	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05
Perfluorotridecanoic acid (PFTrDA)	µg/L	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02
Perfluoroundecanoic acid (PFUnDA)	µg/L	0	<0.02	<0.1	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02
PFAS - Fluorotelomer Sulfonic Acids																					
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	18	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05
PFAS - Perfluoroalkyl Sulfonamides																					
Perfluorooctane sulfonamide (FOSA)	µg/L	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0	<0.02	<0.1	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0	<0.02	<0.1	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
PFAS																					
Sum of PFAS (WA DER List)	µg/L	9	18.4	18.26	1	<0.01	<0.01	0	<0.01	<0.05	0	0.01	0.01	0	0.01	<0.05	0	0.04	0.02	67	0.04
Sum of PFHxS and PFOS	µg/L	12	13.4	13	3	<0.01	<0.01	0	<0.01	<0.01	0	0.01	0.01	0	0.01	<0.01	0	<0.01	<0.01	0	<0.01
Sum of PFAS	µg/L	8	20.5	20.42	0	<0.01	<0.01	0	<0.01	<0.1	0	0.01	0.01	0	0.01	<0.1	0	0.04	0.02	67	0.04
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L			13.64						<0.01						<0.01					
Sum of PFAS (PFOS + PFOA)	µg/L			6.04						<0.01						<0.01					
Metals																					
Calcium (filtered)	mg/L	1	119			400	399	0	400			471	490	4	471			407	417	2	407
Magnesium (filtered)	mg/L	1	73			1,300	1,300	0	1,300			1,490	1,540	3	1,490			1,310	1,330	2	1,310
Potassium (filtered)	mg/L	0	27			517	516	0	517			600	622	4	600			515	531	3	515

*RPDs have only been considered where a concentration
**Elevated RPDs are highlighted as per QAQC Profile sett
***Interlab Duplicates are matched on a per compound l

		31/08/2021		1/09/2021	1/09/2021		1/09/2021	1/09/2021	
		0089_QC217_210831		0089_PW369_210901	0089_QC118_210901		0089_PW369_210901	0089_QC218_210901	
		Water		Water	Water		Water	Water	
		821197	RPD	EP2110154	EP2110154	RPD	EP2110154	822579	RPD
	Unit								
PFAS - Perfluoroalkyl Sulfonic Acids									
Perfluoropropanesulfonic acid (PFPrS)	µg/L	<0.01						<0.01	
Perfluorobutane sulfonic acid (PFBS)	µg/L	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	<0.01	0	<0.01	<0.01	0	<0.01	0.01	0
Perfluorononanesulfonic acid (PFNS)	µg/L	<0.01						<0.01	
Perfluorodecane sulfonic acid (PFDS)	µg/L	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	µg/L	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.03	40	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	µg/L	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS									
Sum of PFAS (WA DER List)	µg/L	0.05	22	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFHxS and PFOS	µg/L	<0.01	0	<0.01	<0.01	0	<0.01	0.01	0
Sum of PFAS	µg/L	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	<0.01						0.01	
Sum of PFAS (PFOS + PFOA)	µg/L	<0.01						0.01	
Metals									
Calcium (filtered)	mg/L			208	208	0	208		
Magnesium (filtered)	mg/L			594	598	1	594		
Potassium (filtered)	mg/L			269	276	3	269		

**RPDs have only been considered where a concentration
**Elevated RPDs are highlighted as per QAQC Profile sett
***Interlab Duplicates are matched on a per compound l

Table B1 - Sediment Relative Percentage Difference Results

Date			30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021		30/08/2021	30/08/2021	
Field ID			0089_SD346_210830	0089_QC105_210830		0089_SD346_210830	0089_QC205_210830		0089_SD340_210830	0089_QC107_210830		0089_SD340_210830	0089_QC207_210830	
Matrix Type			Soil	Soil		Soil	Soil		Soil	Soil		Soil	Soil	
Lab Report Number			EP2110018	EP2110018	RPD	EP2110018	820919	RPD	EP2110023	EP2110023	RPD	EP2110023	820919	RPD
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluoropropanesulfonic acid (PFPrS)	mg/kg	0.005					<0.005						<0.005	
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	0.0024	0.0022	9	0.0024	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanesulfonic acid (PFNS)	mg/kg	0.005					<0.005						<0.005	
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
PFAS - Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS														
Sum of PFAS (WA DER List)	mg/kg	0.0002	0.0024	0.0022	9	0.0024	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
Sum of PFHxS and PFOS	mg/kg	0.0002	0.0024	0.0022	9	0.0024	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Sum of PFAS	mg/kg	0.0002	0.0024	0.0022	9	0.0024	<0.05	0	<0.0002	<0.0002	0	<0.0002	<0.05	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	mg/kg	0.005					<0.005						<0.005	
Sum of PFAS (PFOS + PFOA)	mg/kg	0.005					<0.005						<0.005	

***RPDs have only been considered where a concentration is greater than 1 times the EQL.**
****Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: No Limit (1 - 10 x EQL); 50 (10 - 20 x EQL); 20 (> 20 x EQL))**
*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory**

		30/08/2021	30/08/2021		30/08/2021	30/08/2021		31/08/2021	31/08/2021		31/08/2021	31/08/2021	
		0089_SD356_210830	0089_QC109_210830		0089_SD356_210830	0089_QC209_210830		0089_SD306_210831	0089_QC115_210831		0089_SD306_210831	0089_QC215_210831	
		Soil	Soil		Soil	Soil		Soil	Soil		Soil	Soil	
		EP2110018	EP2110018	RPD	EP2110018	820919	RPD	EP2110074	EP2110074	RPD	EP2110074	821197	RPD
	Unit												
PFAS - Perfluoroalkyl Sulfonic Acids													
Perfluoropropanesulfonic acid (PFPrS)	mg/kg					<0.005						<0.005	
Perfluorobutane sulfonic acid (PFBS)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanesulfonic acid (PFNS)	mg/kg					<0.005						<0.005	
Perfluorodecane sulfonic acid (PFDS)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
PFAS - Perfluoroalkyl Carboxylic Acids													
Perfluorobutanoic acid (PFBA)	mg/kg	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
Perfluorohexanoic acid (PFHxA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctanoic acid (PFOA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorodecanoic acid (PFDA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanoic acid (PFNA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
PFAS - Fluorotelomer Sulfonic Acids													
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS - Perfluoroalkyl Sulfonamides													
Perfluorooctane sulfonamide (FOSA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS													
Sum of PFAS (WA DER List)	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
Sum of PFHxS and PFOS	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Sum of PFAS	mg/kg	<0.0002	<0.0002	0	<0.0002	<0.05	0	<0.0002	<0.0002	0	<0.0002	<0.05	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	mg/kg					<0.005						<0.005	
Sum of PFAS (PFOS + PFOA)	mg/kg					<0.005						<0.005	

*RPDs have only been considered where a concentration
**Elevated RPDs are highlighted as per QAQC Profile sett
***Interlab Duplicates are matched on a per compound b

APPENDIX

C

LABORATORY CERTIFICATES

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☐ **Sydney**
Unit F3 - 6 Building F, 16 Mars Road, Lane Cove
Phone: +612 9900 8400
Email: enviro.syd@mgtlabmark.com.au

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☐ **Melbourne**
2 Kingston Town Close, Oakleigh, VIC 3166
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Email: enquiries.melb@mgtlabmark.com.au

CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Company Name : Cardno (WA) Pty Ltd	Contact Name : [redacted]	Purchase Order : DEF19009	COC Number : DEF19009 -01
Office Address : 11 Harvest Terrace, West perth, WA, 6005		PROJECT Number : WA_0089_PFASOMP	Eurofins | mgt quote ID : NA
	Email for COC/SRN/Results : [redacted]	PROJECT Name : DEF19009/Stirling	Data output format: PDF; ESDAT

Special Directions & Comments :
Please sendESdat files to [redacted] with the project No in the header file

Please send email invoice to
[redacted]

Eurofins | mgt DI water batch number:

	Sample ID	Date	Matrix	PFAS (28 analytes)
1	0089_QC201_210830	30/08/2021	Water	X
2	0089_QC202_210830	30/08/2021	Water	X
3	0089_QC203_210830	30/08/2021	Water	X
4	0089_QC204_210830	30/08/2021	Water	X
5	0089_QC205_210830	30/08/2021	Soil	X
6	0089_QC206_210830	30/08/2021	Water	X
7	0089_QC207_210830	30/08/2021	Soil	X
8	0089_QC208_210830	30/08/2021	Water	X
9	0089_QC209_210830	30/08/2021	Soil	X
10	0089_QC210_210830	30/08/2021	Water	X
11	0089_QC211_210830	30/08/2021	Water	X
12	0089_QC212_210830	30/08/2021	Water	X
13	0089_QC213_210830	30/08/2021	Water	X

Analytes

Some common holding times (with correct preservation).
For further information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous iron	7 days	ASLP, TCLP	7 days

Containers:

1LP	250P	125P	1LA	40mL vial	125mL A	Jar	

Sample comments:

Relinquished By: Maelle Bourdais	Laboratory Staff: Received [redacted]	Turn around time	Method Of Shipment	Temperature on arrival:
Date & Time : 31/08/2021	Date & Time : 31/8/21 12:18	1 DAY ☐ 2 DAY ☐ 3 DAY ☐	☑ Courier	15.1°C
Signature:	Signature: [redacted]	STANDARD ☑ Other:	☐ Hand Delivered	Report number:
			☐ Postal	820919
			Courier Consignment # :	

Date/Time 31/8/21 12:18
Chiller
Final temp: 15.1°C

eurofins | Environment Testing

ABN: 50 005 085 521 www.eurofins.com.au EnviroSales@eurofins.com

Australia

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Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	Cardno (WA)
Contact name:	[redacted]
Project name:	DEF19009/STIRLING
Project ID:	WA_0089_PFASOMP
Turnaround time:	5 Day
Date/Time received	Aug 31, 2021 12:18 PM
Eurofins reference	820919

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

[redacted] **on phone :** [redacted] **or by email:** [redacted]

Results will be delivered electronically via email to [redacted] - [redacted]

Note: A copy of these results will also be delivered to the general Cardno (WA) email address.

Global Leader - Results you can trust

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Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: DEF19009/STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009
Report #: 820919
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Aug 31, 2021 12:18 PM
Due: Sep 7, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0089_QC201_210830	Aug 30, 2021		Water	P21-Au58207		X
2	0089_QC202_210830	Aug 30, 2021		Water	P21-Au58208		X
3	0089_QC203_210830	Aug 30, 2021		Water	P21-Au58209		X
4	0089_QC204_210830	Aug 30, 2021		Water	P21-Au58210		X
5	0089_QC205_210830	Aug 30, 2021		Soil	P21-Au58211	X	X
6	0089_QC206_	Aug 30, 2021		Water	P21-Au58212		X

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ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: DEF19009/STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009
Report #: 820919
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Aug 31, 2021 12:18 PM
Due: Sep 7, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
	210830						
7	0089_QC207_210830	Aug 30, 2021		Soil	P21-Au58213	X	X
8	0089_QC208_210830	Aug 30, 2021		Water	P21-Au58214		X
9	0089_QC209_210830	Aug 30, 2021		Soil	P21-Au58215	X	X
10	0089_QC210_210830	Aug 30, 2021		Water	P21-Au58216		X
11	0089_QC211_210830	Aug 30, 2021		Water	P21-Au58217		X
12	0089_QC212_210830	Aug 30, 2021		Water	P21-Au58218		X

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ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

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IANZ # 1290

Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: DEF19009/STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009
Report #: 820919
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Aug 31, 2021 12:18 PM
Due: Sep 7, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
13	0089_QC213_210830	Aug 30, 2021		Water	P21-Au58219		X
Test Counts						3	13

Cardno Consulting WA
11 Harvest Terrace
West Perth
WA 6005

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: [redacted]

Report **820919-S**
Project name DEF19009/STIRLING
Project ID WA_0089_PFASOMP
Received Date Aug 31, 2021

Client Sample ID			**0089_QC205_210830**	**0089_QC207_210830**	**0089_QC209_210830**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P21-Au58211**	**P21-Au58213**	**P21-Au58215**
Date Sampled			**Aug 30, 2021**	**Aug 30, 2021**	**Aug 30, 2021**
Test/Reference	LOR	Unit			
% Moisture	1	%	26	22	24
Perfluoroalkyl carboxylic acids (PFCAs)					
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	50	43	53
13C5-PFPeA (surr.)	1	%	61	53	64
13C5-PFHxA (surr.)	1	%	61	57	65
13C4-PFHpA (surr.)	1	%	59	53	60
13C8-PFOA (surr.)	1	%	59	52	60
13C5-PFNA (surr.)	1	%	74	64	76
13C6-PFDA (surr.)	1	%	103	76	98
13C2-PFUnDA (surr.)	1	%	112	98	114
13C2-PFDoDA (surr.)	1	%	97	87	104
13C2-PFTeDA (surr.)	1	%	74	60	74
Perfluoroalkyl sulfonamido substances					
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	5	ug/kg	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	5	ug/kg	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10	< 10	< 10

Client Sample ID			0089_QC205_210830	0089_QC207_210830	0089_QC209_210830
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			P21-Au58211	P21-Au58213	P21-Au58215
Date Sampled			Aug 30, 2021	Aug 30, 2021	Aug 30, 2021
Test/Reference	LOR	Unit			
Perfluoroalkyl sulfonamido substances					
13C8-FOSA (surr.)	1	%	97	96	95
D3-N-MeFOSA (surr.)	1	%	89	79	90
D5-N-EtFOSA (surr.)	1	%	92	86	91
D7-N-MeFOSE (surr.)	1	%	82	74	83
D9-N-EtFOSE (surr.)	1	%	77	74	80
D5-N-EtFOSAA (surr.)	1	%	75	60	78
D3-N-MeFOSAA (surr.)	1	%	79	60	80
Perfluoroalkyl sulfonic acids (PFSAs)					
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	65	60	65
18O2-PFHxS (surr.)	1	%	65	68	67
13C8-PFOS (surr.)	1	%	103	98	107
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	21	20	26
13C2-6:2 FTSA (surr.)	1	%	33	25	30
13C2-8:2 FTSA (surr.)	1	%	58	50	57
13C2-10:2 FTSA (surr.)	1	%	90	67	86
PFASs Summations					
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	< 50

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
% Moisture	Brisbane	Aug 31, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Sep 06, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Sep 06, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Sep 06, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Sep 06, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

eurofins | Environment Testing

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NATA # 1261 Site # 18217

Brisbane
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Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: DEF19009/STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009
Report #: 820919
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Aug 31, 2021 12:18 PM
Due: Sep 7, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0089_QC201_210830	Aug 30, 2021		Water	P21-Au58207		X
2	0089_QC202_210830	Aug 30, 2021		Water	P21-Au58208		X
3	0089_QC203_210830	Aug 30, 2021		Water	P21-Au58209		X
4	0089_QC204_210830	Aug 30, 2021		Water	P21-Au58210		X
5	0089_QC205_210830	Aug 30, 2021		Soil	P21-Au58211	X	X
6	0089_QC206_	Aug 30, 2021		Water	P21-Au58212		X

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Melbourne Laboratory - NATA Site # 1254							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
	210830						
7	0089_QC207_210830	Aug 30, 2021		Soil	P21-Au58213	X	X
8	0089_QC208_210830	Aug 30, 2021		Water	P21-Au58214		X
9	0089_QC209_210830	Aug 30, 2021		Soil	P21-Au58215	X	X
10	0089_QC210_210830	Aug 30, 2021		Water	P21-Au58216		X
11	0089_QC211_210830	Aug 30, 2021		Water	P21-Au58217		X
12	0089_QC212_210830	Aug 30, 2021		Water	P21-Au58218		X

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Received: Aug 31, 2021 12:18 PM
Due: Sep 7, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
13	0089_QC213_210830	Aug 30, 2021		Water	P21-Au58219		X
Test Counts						3	13

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	104			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	101			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	105			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	107			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	113			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	108			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	118			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	113			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	117			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	121			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	112			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	111			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	114			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	107			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	112			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	104			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	111			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	115			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	98			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	95			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	107			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	90			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	97			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	108			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	105			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	99			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	104			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	100			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	108			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	P21-Au58215	CP	%	105			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	P21-Au58215	CP	%	102			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	P21-Au58215	CP	%	106			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	P21-Au58215	CP	%	105			50-150	Pass	
Perfluorooctanoic acid (PFOA)	P21-Au58215	CP	%	109			50-150	Pass	
Perfluorononanoic acid (PFNA)	P21-Au58215	CP	%	113			50-150	Pass	
Perfluorodecanoic acid (PFDA)	P21-Au58215	CP	%	114			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	P21-Au58215	CP	%	107			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	P21-Au58215	CP	%	113			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	P21-Au58215	CP	%	109			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P21-Au58215	CP	%	113			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	P21-Au58215	CP	%	111			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P21-Au58215	CP	%	104			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P21-Au58215	CP	%	107			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P21-Au58215	CP	%	106			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P21-Au58215	CP	%	110			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P21-Au58215	CP	%	110			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P21-Au58215	CP	%	115			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	P21-Au58215	CP	%	96			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	P21-Au58215	CP	%	86			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P21-Au58215	CP	%	98			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P21-Au58215	CP	%	88			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P21-Au58215	CP	%	93			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P21-Au58215	CP	%	129			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	P21-Au58215	CP	%	94			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	P21-Au58215	CP	%	86			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P21-Au58215	CP	%	88			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P21-Au58215	CP	%	86			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P21-Au58215	CP	%	96			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P21-Au58215	CP	%	109			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B21-Se07006	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B21-Se07006	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B21-Se07006	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	P21-Au58215	CP	%	24	22	9.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

[redacted] Analytical Services Manager

[redacted] Senior Analyst-PFAS (QLD)

[redacted]

[redacted]

General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Attention: [redacted]

Report **820919-W**
Project name DEF19009/STIRLING
Project ID WA_0089_PFASOMP
Received Date Aug 31, 2021

Client Sample ID			**0089_QC201_210830**	[G01]**0089_QC202_210830**	[G01]**0089_QC203_210830**	**0089_QC204_210830**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**P21-Au58207**	**P21-Au58208**	**P21-Au58209**	**P21-Au58210**
Date Sampled			**Aug 30, 2021**	**Aug 30, 2021**	**Aug 30, 2021**	**Aug 30, 2021**
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.1	< 0.1	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	< 0.1	< 0.1	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	0.04	< 0.1	< 0.1	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	< 0.1	< 0.1	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.1	< 0.1	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.1	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.1	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.1	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.1	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.1	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.1	< 0.01
13C4-PFBA (surr.)	1	%	40	122	117	53
13C5-PFPeA (surr.)	1	%	49	132	126	75
13C5-PFHxA (surr.)	1	%	50	108	112	70
13C4-PFHpA (surr.)	1	%	66	111	122	72
13C8-PFOA (surr.)	1	%	77	111	115	98
13C5-PFNA (surr.)	1	%	89	12	116	101
13C6-PFDA (surr.)	1	%	70	11	117	86
13C2-PFUnDA (surr.)	1	%	76	15	129	105
13C2-PFDoDA (surr.)	1	%	52	11	117	71
13C2-PFTeDA (surr.)	1	%	57	15	133	78
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.1	< 0.1	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.1	< 0.05
13C8-FOSA (surr.)	1	%	101	88	14	120
D3-N-MeFOSA (surr.)	1	%	85	83	86	97

Client Sample ID			0089_QC201_210830	[G01]0089_QC202_210830	[G01]0089_QC203_210830	0089_QC204_210830
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			P21-Au58207	P21-Au58208	P21-Au58209	P21-Au58210
Date Sampled			Aug 30, 2021	Aug 30, 2021	Aug 30, 2021	Aug 30, 2021
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
D5-N-EtFOSA (surr.)	1	%	66	66	72	79
D7-N-MeFOSE (surr.)	1	%	101	96	124	124
D9-N-EtFOSE (surr.)	1	%	97	96	124	130
D5-N-EtFOSAA (surr.)	1	%	INT	149	139	19
D3-N-MeFOSAA (surr.)	1	%	INT	INT	140	10
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	0.05	< 0.01	0.02	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	0.02	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	[N09]0.05	< 0.01	[N09]0.03	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	[N09]0.25	[N09]0.06	[N09]0.19	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	[N09]0.02	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]0.02	[N09]0.28	[N09]0.65	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	110	115	27	123
18O2-PFHxS (surr.)	1	%	93	92	117	105
13C8-PFOS (surr.)	1	%	120	94	121	130
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.1	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.1	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.1	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.1	< 0.01
13C2-4:2 FTSA (surr.)	1	%	68	INT	76	85
13C2-6:2 FTSA (surr.)	1	%	49	INT	109	55
13C2-8:2 FTSA (surr.)	1	%	59	12	70	63
13C2-10:2 FTSA (surr.)	1	%	76	14	128	71
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	0.27	0.34	0.84	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.02	0.28	0.65	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.27	0.34	0.84	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	0.36	0.34	0.86	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	0.43	0.34	0.91	< 0.1

Client Sample ID			0089_QC206_210830	0089_QC208_210830	0089_QC210_210830	0089_QC211_210830
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			P21-Au58212	P21-Au58214	P21-Au58216	P21-Au58217
Date Sampled			Aug 30, 2021	Aug 30, 2021	Aug 30, 2021	Aug 30, 2021
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01

Client Sample ID			0089_QC206_210830	0089_QC208_210830	0089_QC210_210830	0089_QC211_210830
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			P21-Au58212	P21-Au58214	P21-Au58216	P21-Au58217
Date Sampled			Aug 30, 2021	Aug 30, 2021	Aug 30, 2021	Aug 30, 2021
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	73	60	30	49
13C5-PFPeA (surr.)	1	%	96	95	41	76
13C5-PFHxA (surr.)	1	%	95	77	43	61
13C4-PFHpA (surr.)	1	%	80	84	39	81
13C8-PFOA (surr.)	1	%	INT	105	55	90
13C5-PFNA (surr.)	1	%	104	99	64	96
13C6-PFDA (surr.)	1	%	83	83	52	85
13C2-PFUnDA (surr.)	1	%	85	85	60	89
13C2-PFDoDA (surr.)	1	%	61	59	41	66
13C2-PFTeDA (surr.)	1	%	61	60	45	55
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	117	120	108	127
D3-N-MeFOSA (surr.)	1	%	78	79	93	88
D5-N-EtFOSA (surr.)	1	%	65	62	82	69
D7-N-MeFOSE (surr.)	1	%	107	98	129	119
D9-N-EtFOSE (surr.)	1	%	100	107	116	119
D5-N-EtFOSAA (surr.)	1	%	INT	INT	INT	INT
D3-N-MeFOSAA (surr.)	1	%	INT	INT	INT	INT
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	[N09]0.02
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	110	121	109	117
18O2-PFHxS (surr.)	1	%	113	107	98	100
13C8-PFOS (surr.)	1	%	121	119	123	121

Client Sample ID			0089_QC206_210830	0089_QC208_210830	0089_QC210_210830	0089_QC211_210830
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			P21-Au58212	P21-Au58214	P21-Au58216	P21-Au58217
Date Sampled			Aug 30, 2021	Aug 30, 2021	Aug 30, 2021	Aug 30, 2021
Test/Reference	LOR	Unit				
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	105	97	55	80
13C2-6:2 FTSA (surr.)	1	%	59	51	35	64
13C2-8:2 FTSA (surr.)	1	%	55	56	36	61
13C2-10:2 FTSA (surr.)	1	%	77	71	45	76
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01	< 0.01	0.02
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	< 0.01	0.02
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			[G01]0089_QC212_210830	[G01]0089_QC213_210830
Sample Matrix			Water	Water
Eurofins Sample No.			P21-Au58218	P21-Au58219
Date Sampled			Aug 30, 2021	Aug 30, 2021
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.1	0.24
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.1	0.45
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.1	2.7
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.1	0.23
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.1	[N09]0.64
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.1	< 0.1
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.1	< 0.1
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.1	< 0.1
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.1	< 0.1
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.1	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.1	< 0.01
13C4-PFBA (surr.)	1	%	102	95
13C5-PFPeA (surr.)	1	%	114	97
13C5-PFHxA (surr.)	1	%	105	95
13C4-PFHpA (surr.)	1	%	109	98
13C8-PFOA (surr.)	1	%	101	106
13C5-PFNA (surr.)	1	%	105	101
13C6-PFDA (surr.)	1	%	102	101
13C2-PFUnDA (surr.)	1	%	109	104
13C2-PFDoDA (surr.)	1	%	105	96
13C2-PFTeDA (surr.)	1	%	133	12

Client Sample ID			G01 0089_QC212_210830	G01 0089_QC213_210830
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**P21-Au58218**	**P21-Au58219**
Date Sampled			**Aug 30, 2021**	**Aug 30, 2021**
Test/Reference	LOR	Unit		
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.1	< 0.1
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.1	< 0.1
13C8-FOSA (surr.)	1	%	18	60
D3-N-MeFOSA (surr.)	1	%	75	90
D5-N-EtFOSA (surr.)	1	%	68	74
D7-N-MeFOSE (surr.)	1	%	116	130
D9-N-EtFOSE (surr.)	1	%	112	128
D5-N-EtFOSAA (surr.)	1	%	118	109
D3-N-MeFOSAA (surr.)	1	%	119	112
Perfluoroalkyl sulfonic acids (PFSAs)				
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	1.0
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	0.60
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	[N09]0.75
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	[N09]7.6
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	[N09]0.81
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	[N09]5.4
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	19	77
18O2-PFHxS (surr.)	1	%	25	72
13C8-PFOS (surr.)	1	%	26	63
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.1	< 0.1
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.1	< 0.1
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.1	< 0.1
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.1	< 0.1
13C2-4:2 FTSA (surr.)	1	%	86	50
13C2-6:2 FTSA (surr.)	1	%	94	74
13C2-8:2 FTSA (surr.)	1	%	56	58
13C2-10:2 FTSA (surr.)	1	%	101	92
PFASs Summations				
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	13
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.1	6.04
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.1	13.64
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.1	18.26
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	20.42

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Sep 03, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Sep 03, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Sep 03, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Sep 03, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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NATA # 1261 Site # 20794

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NATA # 1261 Site # 23736

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IANZ # 1290

Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: DEF19009/STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009
Report #: 820919
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Aug 31, 2021 12:18 PM
Due: Sep 7, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0089_QC201_210830	Aug 30, 2021		Water	P21-Au58207		X
2	0089_QC202_210830	Aug 30, 2021		Water	P21-Au58208		X
3	0089_QC203_210830	Aug 30, 2021		Water	P21-Au58209		X
4	0089_QC204_210830	Aug 30, 2021		Water	P21-Au58210		X
5	0089_QC205_210830	Aug 30, 2021		Soil	P21-Au58211	X	X
6	0089_QC206_	Aug 30, 2021		Water	P21-Au58212		X

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Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
	210830						
7	0089_QC207_210830	Aug 30, 2021		Soil	P21-Au58213	X	X
8	0089_QC208_210830	Aug 30, 2021		Water	P21-Au58214		X
9	0089_QC209_210830	Aug 30, 2021		Soil	P21-Au58215	X	X
10	0089_QC210_210830	Aug 30, 2021		Water	P21-Au58216		X
11	0089_QC211_210830	Aug 30, 2021		Water	P21-Au58217		X
12	0089_QC212_210830	Aug 30, 2021		Water	P21-Au58218		X

eurofins | Environment Testing

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Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
13	0089_QC213_210830	Aug 30, 2021		Water	P21-Au58219		X
Test Counts						3	13

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	124			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	99			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	113			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	105			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	89			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	96			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	91			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	96			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	108			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	95			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	70			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	101			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	96			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	105			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	103			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	83			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	113			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	93			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	75			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	85			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	89			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	79			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	104			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	126			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	92			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	72			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	104			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	123			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	118			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	91			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	P21-Au58208	CP	%	98			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	P21-Au58208	CP	%	110			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	P21-Au58208	CP	%	127			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	P21-Au58208	CP	%	95			50-150	Pass	
Perfluorooctanoic acid (PFOA)	P21-Au58208	CP	%	95			50-150	Pass	
Perfluorononanoic acid (PFNA)	P21-Au58208	CP	%	90			50-150	Pass	
Perfluorodecanoic acid (PFDA)	P21-Au58208	CP	%	81			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	P21-Au58208	CP	%	74			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	P21-Au58208	CP	%	75			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	P21-Au58208	CP	%	73			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P21-Au58208	CP	%	53			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	P21-Au58208	CP	%	101			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P21-Au58208	CP	%	83			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P21-Au58208	CP	%	92			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P21-Au58208	CP	%	81			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P21-Au58208	CP	%	67			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P21-Au58208	CP	%	107			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P21-Au58208	CP	%	53			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	P21-Au58208	CP	%	72			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	P21-Au58208	CP	%	79			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P21-Au58208	CP	%	103			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P21-Au58208	CP	%	81			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P21-Au58208	CP	%	76			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P21-Au58208	CP	%	122			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	P21-Au58208	CP	%	101			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	P21-Au58208	CP	%	66			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P21-Au58208	CP	%	108			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P21-Au58208	CP	%	109			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P21-Au58208	CP	%	121			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P21-Au58208	CP	%	82			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	P21-Au58207	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	P21-Au58207	CP	ug/L	0.04	0.05	4.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	P21-Au58207	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P21-Au58207	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P21-Au58207	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P21-Au58207	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P21-Au58207	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P21-Au58207	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P21-Au58207	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	P21-Au58207	CP	ug/L	0.05	0.05	2.0	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P21-Au58207	CP	ug/L	0.02	0.02	9.0	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P21-Au58207	CP	ug/L	0.05	0.05	6.0	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P21-Au58207	CP	ug/L	0.25	0.23	10	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	P21-Au58207	CP	ug/L	0.02	0.02	11	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P21-Au58207	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P21-Au58207	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	P21-Au58209	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P21-Au58209	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P21-Au58209	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P21-Au58209	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P21-Au58209	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	P21-Au58209	CP	ug/L	0.02	0.02	5.0	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	P21-Au58209	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P21-Au58209	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P21-Au58209	CP	ug/L	0.03	0.03	7.0	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P21-Au58209	CP	ug/L	0.19	0.23	21	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P21-Au58209	CP	ug/L	0.02	0.02	2.0	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	P21-Au58209	CP	ug/L	0.65	0.76	16	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	P21-Au58209	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P21-Au58209	CP	ug/L	< 0.1	< 0.1	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

[redacted] Analytical Services Manager

[redacted] Senior Analyst-PFAS (QLD)

[redacted]

[redacted]

General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Company Name : Cardno (WA) Pty Ltd	**Contact Name :** [redacted]	**Purchase Order :** DEF19009	**COC Number :** DEF19009 -02
Office Address : 11 Harvest Terrace, West perth, WA, 6005		**PROJECT Number :** WA_0089_PFASOMP	**Eurofins | mgt quote ID :** NA
	Email for COC/SRN/Results : [redacted]	**PROJECT Name :** DEF19009/Stirling	**Data output format:** PDF; ESDAT

Special Directions & Comments :
Please sendESdat files to [redacted] with the project No in the header file

Please send email invoice to [redacted]

Eurofins | mgt DI water batch number:

	Sample ID	Date	Matrix	PFAS (28 analytes)
1	0089_QC214_210831	31/08/2021	Water	X
2	0089_QC215_210831	31/08/2021	Soil	X
3	0089_QC216_210831	31/08/2021	Water	X
4	0089_QC217_210831	31/08/2021	Water	X
5				
6				
7				
8				
9				
10				

Some common holding times (with correct preservation).
For further information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous Iron	7 days	ASLP, TCLP	7 days

Containers:

1LP	250P	125P	1LA	40mL vial	125mL A	Jar	

Sample comments:

Relinquished By: Maelle Bourdais
Date & Time : 1/09/2021
Signature:

Laboratory Staff
Received By: [redacted]
Date & Time : 1/9/21 11:11
Signature: [redacted]

Turn around time
1 DAY ☐ 2 DAY ☐ 3 DAY ☐
STANDARD ☑ Other:

Method Of Shipment
☑ Courier
☐ Hand Delivered
☐ Postal
Courier Consignment # :

Temperature on arrival: 11.1°C

Report number: 821197

Date/Time: 1/9/21 11:11
Chilled: (Yes) / No
12.1
6.8
8.4
Correction: -0.3
Final Temp: 11.1°C

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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	Cardno (WA)
Contact name:	[redacted]
Project name:	DEF19009/STIRLING
Project ID:	WA_0089_PFASOMP
Turnaround time:	5 Day
Date/Time received	Sep 1, 2021 11:11 AM
Eurofins reference	821197

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
N/A	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

[redacted] **on phone :** [redacted] **or by email:** [redacted]

Results will be delivered electronically via email to [redacted] - [redacted]

Note: A copy of these results will also be delivered to the general Cardno (WA) email address.

Global Leader - Results you can trust

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: DEF19009/STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009
Report #: 821197
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Sep 1, 2021 11:11 AM
Due: Sep 8, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0089_QC214_210831	Aug 31, 2021		Water	P21-Se01570		X
2	0089_QC215_210831	Aug 31, 2021		Soil	P21-Se01571	X	X
3	0089_QC216_210831	Aug 31, 2021		Water	P21-Se01572		X
4	0089_QC217_210831	Aug 31, 2021		Water	P21-Se01573		X
Test Counts						1	4

Cardno Consulting WA
11 Harvest Terrace
West Perth
WA 6005

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: [redacted]

Report **821197-S**
Project name DEF19009/STIRLING
Project ID WA_0089_PFASOMP
Received Date Sep 01, 2021

Client Sample ID			**0089_QC215_210831**
Sample Matrix			**Soil**
Eurofins Sample No.			**P21-Se01571**
Date Sampled			**Aug 31, 2021**
Test/Reference	LOR	Unit	
% Moisture	1	%	22
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	42
13C5-PFPeA (surr.)	1	%	51
13C5-PFHxA (surr.)	1	%	54
13C4-PFHpA (surr.)	1	%	52
13C8-PFOA (surr.)	1	%	51
13C5-PFNA (surr.)	1	%	60
13C6-PFDA (surr.)	1	%	88
13C2-PFUnDA (surr.)	1	%	100
13C2-PFDoDA (surr.)	1	%	91
13C2-PFTeDA (surr.)	1	%	52
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	5	ug/kg	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	5	ug/kg	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10

Client Sample ID			0089_QC215_210831
Sample Matrix			**Soil**
Eurofins Sample No.			**P21-Se01571**
Date Sampled			**Aug 31, 2021**
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
13C8-FOSA (surr.)	1	%	81
D3-N-MeFOSA (surr.)	1	%	78
D5-N-EtFOSA (surr.)	1	%	72
D7-N-MeFOSE (surr.)	1	%	72
D9-N-EtFOSE (surr.)	1	%	69
D5-N-EtFOSAA (surr.)	1	%	81
D3-N-MeFOSAA (surr.)	1	%	84
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	61
18O2-PFHxS (surr.)	1	%	62
13C8-PFOS (surr.)	1	%	93
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5
13C2-4:2 FTSA (surr.)	1	%	22
13C2-6:2 FTSA (surr.)	1	%	34
13C2-8:2 FTSA (surr.)	1	%	21
13C2-10:2 FTSA (surr.)	1	%	86
PFASs Summations			
Sum (PFHxS + PFOS)*	5	ug/kg	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
% Moisture	Brisbane	Sep 01, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Sep 04, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Sep 04, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Sep 04, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Sep 04, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

eurofins | Environment Testing

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: DEF19009/STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009
Report #: 821197
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Received: Sep 1, 2021 11:11 AM
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Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0089_QC214_210831	Aug 31, 2021		Water	P21-Se01570		X
2	0089_QC215_210831	Aug 31, 2021		Soil	P21-Se01571	X	X
3	0089_QC216_210831	Aug 31, 2021		Water	P21-Se01572		X
4	0089_QC217_210831	Aug 31, 2021		Water	P21-Se01573		X
Test Counts						1	4

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	104			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	101			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	105			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	107			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	113			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	108			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	118			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	113			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	117			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	121			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	112			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	111			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	114			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	107			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	112			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	104			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	111			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	115			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	98			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	95			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	107			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	90			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	97			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	108			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	105			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	99			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	104			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	100			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	108			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	P21-Au58215	NCP	%	105			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	P21-Au58215	NCP	%	102			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	P21-Au58215	NCP	%	106			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	P21-Au58215	NCP	%	105			50-150	Pass	
Perfluorooctanoic acid (PFOA)	P21-Au58215	NCP	%	109			50-150	Pass	
Perfluorononanoic acid (PFNA)	P21-Au58215	NCP	%	113			50-150	Pass	
Perfluorodecanoic acid (PFDA)	P21-Au58215	NCP	%	114			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	P21-Au58215	NCP	%	107			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	P21-Au58215	NCP	%	113			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	P21-Au58215	NCP	%	109			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P21-Au58215	NCP	%	113			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	P21-Au58215	NCP	%	111			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P21-Au58215	NCP	%	104			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P21-Au58215	NCP	%	107			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P21-Au58215	NCP	%	106			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P21-Au58215	NCP	%	110			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P21-Au58215	NCP	%	110			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P21-Au58215	NCP	%	115			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	P21-Au58215	NCP	%	96			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	P21-Au58215	NCP	%	86			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P21-Au58215	NCP	%	98			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P21-Au58215	NCP	%	88			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P21-Au58215	NCP	%	93			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P21-Au58215	NCP	%	129			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	P21-Au58215	NCP	%	94			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	P21-Au58215	NCP	%	86			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P21-Au58215	NCP	%	88			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P21-Au58215	NCP	%	86			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P21-Au58215	NCP	%	96			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P21-Au58215	NCP	%	109			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B21-Se03072	NCP	%	16	16	3.0	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B21-Se07006	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B21-Se07006	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B21-Se07006	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B21-Se07006	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

[redacted] Analytical Services Manager

[redacted] Senior Analyst-PFAS (QLD)

[redacted]

[redacted]

General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
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Attention: [redacted]

Report **821197-W**
Project name DEF19009/STIRLING
Project ID WA_0089_PFASOMP
Received Date Sep 01, 2021

Client Sample ID			**0089_QC214_210831**	**0089_QC216_210831**	**0089_QC217_210831**
Sample Matrix			**Water**	**Water**	**Water**
Eurofins Sample No.			**P21-Se01570**	**P21-Se01572**	**P21-Se01573**
Date Sampled			**Aug 31, 2021**	**Aug 31, 2021**	**Aug 31, 2021**
Test/Reference	LOR	Unit			
Perfluoroalkyl carboxylic acids (PFCAs)					
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	< 0.01	0.02
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	< 0.01	0.03
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	65	65	49
13C5-PFPeA (surr.)	1	%	103	101	74
13C5-PFHxA (surr.)	1	%	83	82	61
13C4-PFHpA (surr.)	1	%	83	90	64
13C8-PFOA (surr.)	1	%	100	106	80
13C5-PFNA (surr.)	1	%	106	115	80
13C6-PFDA (surr.)	1	%	91	92	69
13C2-PFUnDA (surr.)	1	%	85	94	68
13C2-PFDoDA (surr.)	1	%	56	63	50
13C2-PFTeDA (surr.)	1	%	39	52	62
Perfluoroalkyl sulfonamido substances					
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	124	128	105
D3-N-MeFOSA (surr.)	1	%	71	76	79

Client Sample ID			0089_QC214_210831	0089_QC216_210831	0089_QC217_210831
Sample Matrix			Water	Water	Water
Eurofins Sample No.			P21-Se01570	P21-Se01572	P21-Se01573
Date Sampled			Aug 31, 2021	Aug 31, 2021	Aug 31, 2021
Test/Reference	LOR	Unit			
Perfluoroalkyl sulfonamido substances					
D5-N-EtFOSA (surr.)	1	%	54	58	67
D7-N-MeFOSE (surr.)	1	%	92	103	98
D9-N-EtFOSE (surr.)	1	%	89	95	98
D5-N-EtFOSAA (surr.)	1	%	INT	INT	INT
D3-N-MeFOSAA (surr.)	1	%	INT	INT	INT
Perfluoroalkyl sulfonic acids (PFSAs)					
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	126	115	103
18O2-PFHxS (surr.)	1	%	119	109	102
13C8-PFOS (surr.)	1	%	125	123	107
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	111	106	76
13C2-6:2 FTSA (surr.)	1	%	67	70	59
13C2-8:2 FTSA (surr.)	1	%	64	70	55
13C2-10:2 FTSA (surr.)	1	%	67	80	64
PFASs Summations					
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05	0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Sep 02, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Sep 02, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Sep 02, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Sep 02, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

eurofins | Environment Testing

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Company Name: Cardno (WA)
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Project Name: DEF19009/STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009
Report #: 821197
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Sep 1, 2021 11:11 AM
Due: Sep 8, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0089_QC214_210831	Aug 31, 2021		Water	P21-Se01570		X
2	0089_QC215_210831	Aug 31, 2021		Soil	P21-Se01571	X	X
3	0089_QC216_210831	Aug 31, 2021		Water	P21-Se01572		X
4	0089_QC217_210831	Aug 31, 2021		Water	P21-Se01573		X
Test Counts						1	4

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	124			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	99			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	113			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	105			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	89			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	96			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	91			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	96			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	108			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	95			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	70			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	101			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	96			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	105			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	103			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	83			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	113			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	93			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	75			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	85			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	89			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	79			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	104			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	126			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	92			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	72			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	104			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	123			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	118			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	91			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	P21-Au58208	NCP	%	98			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	P21-Au58208	NCP	%	110			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	P21-Au58208	NCP	%	127			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	P21-Au58208	NCP	%	95			50-150	Pass	
Perfluorooctanoic acid (PFOA)	P21-Au58208	NCP	%	95			50-150	Pass	
Perfluorononanoic acid (PFNA)	P21-Au58208	NCP	%	90			50-150	Pass	
Perfluorodecanoic acid (PFDA)	P21-Au58208	NCP	%	81			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	P21-Au58208	NCP	%	74			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	P21-Au58208	NCP	%	75			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	P21-Au58208	NCP	%	73			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P21-Au58208	NCP	%	53			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	P21-Au58208	NCP	%	101			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P21-Au58208	NCP	%	83			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P21-Au58208	NCP	%	92			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P21-Au58208	NCP	%	81			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P21-Au58208	NCP	%	67			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P21-Au58208	NCP	%	107			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P21-Au58208	NCP	%	53			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	P21-Au58208	NCP	%	72			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	P21-Au58208	NCP	%	79			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P21-Au58208	NCP	%	103			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P21-Au58208	NCP	%	81			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P21-Au58208	NCP	%	76			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P21-Au58208	NCP	%	122			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	P21-Au58208	NCP	%	101			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	P21-Au58208	NCP	%	66			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P21-Au58208	NCP	%	108			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P21-Au58208	NCP	%	109			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P21-Au58208	NCP	%	121			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P21-Au58208	NCP	%	82			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	P21-Au58207	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	P21-Au58207	NCP	ug/L	0.04	0.05	4.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	P21-Au58209	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P21-Au58209	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P21-Au58209	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P21-Au58209	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P21-Au58209	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P21-Au58207	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P21-Au58207	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	P21-Au58209	NCP	ug/L	0.02	0.02	5.0	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	P21-Au58209	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P21-Au58209	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P21-Au58209	NCP	ug/L	0.03	0.03	7.0	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P21-Au58207	NCP	ug/L	0.25	0.23	10	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P21-Au58209	NCP	ug/L	0.02	0.02	2.0	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	P21-Au58207	NCP	ug/L	0.02	0.02	11	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	P21-Au58209	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P21-Au58207	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P21-Au58207	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

[redacted] Analytical Services Manager

[redacted] Senior Analyst-PFAS (QLD)

[redacted]

[redacted]

General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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☐ **Melbourne**
2 Kingston Town Close, Oakleigh, VIC 3166
Phone: +613 8564 5000 Fax: +613 8564 5090
Email: enquiries.melb@mgtlabmark.com.au

CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Company Name : Cardno (WA) Pty Ltd	**Contact Name :** [redacted]	**Purchase Order :** DEF19009	**COC Number :** DEF19009 -03
Office Address : 11 Harvest Terrace, West perth, WA, 6005		**PROJECT Number :** WA_0089_PFASOMP	**Eurofins | mgt quote ID :** NA
	Email for COC/SRN/Results : [redacted]	**PROJECT Name :** DEF19009/Stirling	**Data output format:** PDF; ESDAT

Special Directions & Comments :
Please sendESdat files to c[redacted] with the project No in the header file

Please send email invoice to [redacted]

Eurofins | mgt DI water batch number:

	Sample ID	Date	Matrix	PFAS (28 analytes)
1	0089_QC218_210831	1/09/2021	Water	X
2				
3				
4				
5				
6				
7				
8				
9				
10				

Some common holding times (with correct preservation).
For further information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous iron	7 days	ASLP, TCLP	7 days

Containers:

1LP	250P	125P	1LA	40mL vial	125mL A	Jar	

Sample comments:

Laboratory Staff

Relinquished By: Maelle Bourdais
Date & Time : 2/09/2021
Signature:

Received: [redacted]
Date & Time : 3/9/21 15:48
Signature: [redacted]

Turn around time

1 DAY ☐ 2 DAY ☐ 3 DAY ☐
STANDARD ☑ Other:

Method Of Shipment

☑ Courier
☐ Hand Delivered
☐ Postal
Courier Consignment # :

Temperature on arrival: 9.1°C

Report number:

822579
EF
7/9/21

Date/Time: 3/9/21 15:48
Chilled: Yes / No
Temp: 8.2 10.3 9.6
Correction: -0.3
Final Temp: 9.1°C

RE: Eurofins Sample Receipt Advice - Report 822579 : Site DEF19009/STIRLING (WA_0089_PFASOMP)

[redacted]

822579
DNEWEF
7/9/21

Tue 7/09/2021 4:12 PM

To: #AU_CAU001_EnviroSampleVic <EnviroSampleVic@eurofins.com>

1 attachments (117 KB)
210901 Eurofins COC.xlsx;

EXTERNAL EMAIL*

Hi [redacted]

Thanks for sending the sample receipt advice, please note below the correct sample ID. Apologies for the mistake on the CoC (amended CoC attached).

0089_QC218_210901

Regards,

[redacted]
ENVIRONMENTAL ENGINEER
CARDNO

Cardno

Phone +61 8 9273 3888 Direct +61 8 6461 0701 Mobile [redacted]
Address 11 Harvest Terrace, West Perth, Western Australia 6005 Australia
Postal PO Box 447, West Perth WA 6872
Email [redacted] Web www.cardno.com
CONNECT WITH CARDNO

Cardno acknowledges the Traditional Owners of the land upon which we live and work and pay our respects to their Elders past, present and emerging - learn more.

Cardno's management systems are certified to ISO9001 (quality) and AS4801/OHSAS18001 (occupational health and safety)

This email and its attachments may contain confidential and/or privileged information for the sole use of the intended recipient(s). All electronically supplied data must be checked against an applicable hardcopy version which shall be the only document which Cardno warrants accuracy. If you are not the intended recipient, any use, distribution or copying of the information contained in this email and its attachments is strictly prohibited. If you have received this email in error, please email the sender by replying to this message and immediately delete and destroy any copies of this email and any attachments. The views or opinions expressed are the author's own and may not reflect the views or opinions of Cardno.

From: EnviroSampleVic@eurofins.com <EnviroSampleVic@eurofins.com>
Sent: Tuesday, 7 September 2021 1:52 PM
To: [redacted]
Subject: Eurofins Sample Receipt Advice - Report 822579 : Site DEF19009/STIRLING (WA_0089_PFASOMP)

Dear Valued Client,

Please find attached a Sample Receipt Advice (SRA), a Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such

eurofins | mgt

Sydney
Unit F3 - 6 Building F, 16 Mars Road, Lane Cove
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2 Kingston Town Close, Oakleigh, VIC 3166
Phone: +613 8564 5000 Fax: +613 8564 5090
Email: enquiries.melb@mgtlabmark.com.au

CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Company Name : Cardno (WA) Pty Ltd	**Contact Name :** Maelle Bourdais	**Purchase Order :** DEF19009	**COC Number :** DEF19009 -03
Office Address : 11 Harvest Terrace, West perth, WA, 6005		**PROJECT Number :** WA_0089_PFASOMP	**Eurofins | mgt quote ID :** NA
	Email for COC/SRN/Results [redacted]	**PROJECT Name :** DEF19009/Stirling	**Data output format:** PDF; ESDAT

Special Directions & Comments :
Please sendESdat files to [redacted] with the project No in the header file

Please send email invoice to [redacted]

Eurofins | mgt DI water batch number:

	Sample ID	Date	Matrix	PFAS (28 analytes)
1	0089_QC218_210901	1/09/2021	Water	X
2				
3				
4				
5				
6				
7				
8				
9				
10				

Some common holding times (with correct preservation).
For further Information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous iron	7 days	ASLP, TCLP	7 days

Containers:

1LP	250P	125P	1LA	40mL vial	125mL A	Jar	

Sample comments:

Laboratory Staff

Relinquished By: Maelle Bourdais
Date & Time : 2/09/2021
Signature:

Received By:
Date & Time :
Signature:

Turn around time

1 DAY | 2 DAY | 3 DAY ☐
STANDARD ☐ | Other:

Method Of Shipment

☑ Courier
☐ Hand Delivered
☐ Postal
Courier Consignment # :

Temperature on arrival:

Report number: 822579

eurofins | Environment Testing

ABN: 50 005 085 521 www.eurofins.com.au EnviroSales@eurofins.com

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NATA # 1261 Site # 20794

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NATA # 1261 Site # 23736

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IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	Cardno (WA)
Contact name:	[redacted]
Project name:	DEF19009/STIRLING
Project ID:	WA_0089_PFASOMP
Turnaround time:	5 Day
Date/Time received	Sep 3, 2021 3:48 PM
Eurofins reference	822579

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

[redacted] **on phone :** [redacted] **or by email:** [redacted]

Results will be delivered electronically via email to [redacted] - [redacted]

Note: A copy of these results will also be delivered to the general Cardno (WA) email address.

Global Leader - Results you can trust

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ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

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IANZ # 1290

Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: DEF19009/STIRLING
Project ID: WA_0089_PFASOMP

Order No.: DEF19009
Report #: 822579
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Sep 3, 2021 3:48 PM
Due: Sep 10, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254						X
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
Mayfield Laboratory - NATA Site # 25079						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	0089_QC218_210901	Sep 01, 2021		Water	M21-Se11940	X
Test Counts						1

Cardno Consulting WA
11 Harvest Terrace
West Perth
WA 6005

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: [redacted]

Report **822579-W**
Project name DEF19009/STIRLING
Project ID WA_0089_PFASOMP
Received Date Sep 03, 2021

Client Sample ID			**0089_QC218_210901**
Sample Matrix			**Water**
Eurofins Sample No.			**M21-Se11940**
Date Sampled			**Sep 01, 2021**
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	93
13C5-PFPeA (surr.)	1	%	87
13C5-PFHxA (surr.)	1	%	81
13C4-PFHpA (surr.)	1	%	85
13C8-PFOA (surr.)	1	%	76
13C5-PFNA (surr.)	1	%	64
13C6-PFDA (surr.)	1	%	48
13C2-PFUnDA (surr.)	1	%	29
13C2-PFDoDA (surr.)	1	%	31
13C2-PFTeDA (surr.)	1	%	22
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	54
D3-N-MeFOSA (surr.)	1	%	33

Client Sample ID			0089_QC218_210901
Sample Matrix			**Water**
Eurofins Sample No.			**M21-Se11940**
Date Sampled			**Sep 01, 2021**
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
D5-N-EtFOSA (surr.)	1	%	27
D7-N-MeFOSE (surr.)	1	%	34
D9-N-EtFOSE (surr.)	1	%	30
D5-N-EtFOSAA (surr.)	1	%	50
D3-N-MeFOSAA (surr.)	1	%	59
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	87
18O2-PFHxS (surr.)	1	%	81
13C8-PFOS (surr.)	1	%	66
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	62
13C2-6:2 FTSA (surr.)	1	%	60
13C2-8:2 FTSA (surr.)	1	%	46
13C2-10:2 FTSA (surr.)	1	%	30
PFASs Summations			
Sum (PFHxS + PFOS)*	0.01	ug/L	0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Sep 07, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Sep 07, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Sep 07, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Sep 07, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Sep 07, 2021	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

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Phone : 0800 856 450
IANZ # 1290

Company Name:	Cardno (WA)	**Order No.:**	DEF19009
Address:	11 Harvest Terrace West Perth WA 6005	**Report #:**	822579
		Phone:	08 9273 3888
		Fax:	08 9388 3831
Project Name:	DEF19009/STIRLING		
Project ID:	WA_0089_PFASOMP		

Received:	Sep 3, 2021 3:48 PM
Due:	Sep 10, 2021
Priority:	5 Day
Contact Name:	[redacted]

Eurofins Analytical Services Manager : [redacted]

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254						X
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
Mayfield Laboratory - NATA Site # 25079						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	0089_QC218_210901	Sep 01, 2021		Water	M21-Se11940	X
Test Counts						1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	112			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	139			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	121			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	140			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	106			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	115			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	119			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	100			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	103			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	125			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	62			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	109			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	92			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	105			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	108			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	109			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	113			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	98			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	106			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	85			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	112			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	94			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	99			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	112			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	109			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	54			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	94			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	139			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	118			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	91			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M21-Se15211	NCP	%	129			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Se15211	NCP	%	135			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Se15211	NCP	%	128			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Se15211	NCP	%	139			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M21-Se15211	NCP	%	113			50-150	Pass	
Perfluorononanoic acid (PFNA)	M21-Se15211	NCP	%	126			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M21-Se15211	NCP	%	119			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M21-Se15211	NCP	%	104			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M21-Se15211	NCP	%	105			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M21-Se15211	NCP	%	108			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Se15211	NCP	%	63			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M21-Se15211	NCP	%	117			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Se15211	NCP	%	120			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Se15211	NCP	%	127			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Se15211	NCP	%	123			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Se15211	NCP	%	119			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Se15211	NCP	%	130			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Se15211	NCP	%	105			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M21-Se15211	NCP	%	109			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M21-Se15211	NCP	%	88			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Se15211	NCP	%	121			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Se15211	NCP	%	115			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Se15211	NCP	%	107			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Se15211	NCP	%	108			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Se15211	NCP	%	69			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Se15211	NCP	%	78			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M21-Se15211	NCP	%	108			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M21-Se15211	NCP	%	123			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M21-Se15211	NCP	%	127			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M21-Se15211	NCP	%	109			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M21-Se12625	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Se12625	NCP	ug/L	0.01	0.01	4.0	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M21-Se12625	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Se12625	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Se12625	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Se12625	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Se12625	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Se12625	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Se12625	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M21-Se12625	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M21-Se12625	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

[redacted] Analytical Services Manager

[redacted] Senior Analyst-PFAS (VIC)

[redacted]

[redacted]

General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110016**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021 13:00
Order number	: DEF19009/730	Date Analysis Commenced	: 01-Sep-2021
C-O-C number	: 26945	Issue Date	: 10-Sep-2021 16:48
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC301_210830	0089_QC303_210830	0089_QC302_210830	0089_QC401_210830	0089_QC402_210830
				Sampling date / time	30-Aug-2021 08:08	30-Aug-2021 08:10	30-Aug-2021 08:10	30-Aug-2021 08:11	30-Aug-2021 08:12
Compound	CAS Number	LOR	Unit		EP2110016-001	EP2110016-002	EP2110016-003	EP2110016-004	EP2110016-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC301_210830	0089_QC303_210830	0089_QC302_210830	0089_QC401_210830	0089_QC402_210830
				Sampling date / time	30-Aug-2021 08:08	30-Aug-2021 08:10	30-Aug-2021 08:10	30-Aug-2021 08:11	30-Aug-2021 08:12
Compound	CAS Number	LOR	Unit		EP2110016-001	EP2110016-002	EP2110016-003	EP2110016-004	EP2110016-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**98.4**	**97.9**	**101**	**104**	**102**
13C8-PFOA	----	0.02	%		**91.3**	**91.6**	**91.5**	**89.7**	**89.5**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC403_210830	0089_QC102_210830	0089_MW233_210830	0089_QC103_210830	0089_MW289_210830
				Sampling date / time	30-Aug-2021 08:13	30-Aug-2021 09:14	30-Aug-2021 09:17	30-Aug-2021 09:37	30-Aug-2021 09:38
Compound	CAS Number	LOR	Unit		EP2110016-006	EP2110016-007	EP2110016-008	EP2110016-009	EP2110016-010
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	118	107	290	308
Total Alkalinity as CaCO3	----	1	mg/L		----	118	107	290	308
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	11	10	57	53
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	40	29	67	68
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	47	40	109	119
Magnesium	7439-95-4	1	mg/L		----	6	5	25	27
Sodium	7440-23-5	1	mg/L		----	20	15	57	54
Potassium	7440-09-7	1	mg/L		----	3	3	5	4
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		----	3.72	3.16	8.87	9.18
ø Total Cations	----	0.01	meq/L		----	3.78	3.14	10.1	10.6
ø Ionic Balance	----	0.01	%		----	0.94	0.43	6.50	7.26
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	0.04	0.04
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	0.04	0.04
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	0.10	0.07	0.24	0.25
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	0.27	0.34	0.76	0.76
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	0.02	<0.02	0.02	0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC403_210830	0089_QC102_210830	0089_MW233_210830	0089_QC103_210830	0089_MW289_210830
				Sampling date / time	30-Aug-2021 08:13	30-Aug-2021 09:14	30-Aug-2021 09:17	30-Aug-2021 09:37	30-Aug-2021 09:38
					EP2110016-006	EP2110016-007	EP2110016-008	EP2110016-009	EP2110016-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC403_210830	0089_QC102_210830	0089_MW233_210830	0089_QC103_210830	0089_MW289_210830
				Sampling date / time	30-Aug-2021 08:13	30-Aug-2021 09:14	30-Aug-2021 09:17	30-Aug-2021 09:37	30-Aug-2021 09:38
					EP2110016-006	EP2110016-007	EP2110016-008	EP2110016-009	EP2110016-010
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.39**	**0.41**	**1.10**	**1.11**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.37**	**0.41**	**1.00**	**1.01**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.39**	**0.41**	**1.06**	**1.07**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	**114**	**103**	**103**	**106**
13C8-PFOA	----	0.02	%		**90.3**	**89.6**	**87.2**	**91.9**	**89.6**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW142_210830	0089_MW149_210830	----	----	----
				Sampling date / time	30-Aug-2021 11:41	30-Aug-2021 12:00	----	----	----
Compound	CAS Number	LOR	Unit		EP2110016-011	EP2110016-012	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**358**	**133**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**358**	**133**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**870**	**2380**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**7010**	**16500**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**291**	**404**	----	----	----
Magnesium	7439-95-4	1	mg/L		**554**	**1270**	----	----	----
Sodium	7440-23-5	1	mg/L		**4100**	**9810**	----	----	----
Potassium	7440-09-7	1	mg/L		**196**	**518**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**223**	**518**	----	----	----
ø Total Cations	----	0.01	meq/L		**243**	**565**	----	----	----
ø Ionic Balance	----	0.01	%		**4.38**	**4.34**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.06**	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.16**	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**3.24**	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.11**	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**2.42**	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.15**	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**1.35**	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.04**	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW142_210830	0089_MW149_210830	----	----	----
				Sampling date / time	30-Aug-2021 11:41	30-Aug-2021 12:00	----	----	----
Compound	CAS Number	LOR	Unit		EP2110016-011	EP2110016-012	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.24**	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW142_210830	0089_MW149_210830	----	----	----
				Sampling date / time	30-Aug-2021 11:41	30-Aug-2021 12:00	----	----	----
Compound	CAS Number	LOR	Unit		EP2110016-011	EP2110016-012	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**7.77**	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**5.66**	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**7.50**	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**105**	**104**	----	----	----
13C8-PFOA	----	0.02	%		**90.0**	**90.7**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110016**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 01-Sep-2021
C-O-C number	: 26945	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[redacted]	Metals Chemist	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3878130)									
EP2110016-012	0089_MW149_210830	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	133	132	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	133	132	0.0	0% - 20%
EP2110011-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	251	250	0.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	251	250	0.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3878503)									
EP2110016-007	0089_QC102_210830	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11	10	0.0	0% - 50%
EP2110019-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1850	1820	1.4	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3878502)									
EP2110016-007	0089_QC102_210830	ED045G: Chloride	16887-00-6	1	mg/L	40	39	3.2	0% - 20%
EP2110019-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	14400	14600	1.3	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3880051)									
EP2110016-007	0089_QC102_210830	ED093F: Calcium	7440-70-2	1	mg/L	47	46	2.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	6	6	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	20	20	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EP2110019-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	408	434	6.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1190	1280	7.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	8280	8920	7.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	398	428	7.4	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3884537)									
EP2110016-011	0089_MW142_210830	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	2.42	2.51	3.4	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.06	0.08	18.2	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.16	0.17	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	3.24	3.50	7.5	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.11	0.09	21.3	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110017-006	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3884537)									
EP2110016-011	0089_MW142_210830	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.24	0.24	0.0	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.15	0.16	8.3	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.35	1.36	1.3	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110017-006	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3884537)									
EP2110016-011	0089_MW142_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3884537) - continued									
EP2110016-011	0089_MW142_210830	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110017-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3884537)									
EP2110016-011	0089_MW142_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110017-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3884537)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 3884537) - continued									
EP2110016-011	0089_MW142_210830	EP231X: Sum of PFAS	----	0.01	µg/L	7.77	8.15	4.8	0% - 20%
EP2110017-006	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3878130)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	111	81.2	126
				<1	200 mg/L	101	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878503)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	94.2	87.7	113
				<1	500 mg/L	97.5	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3878502)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	88.8	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3880051)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	94.8	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.6	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	92.8	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	90.6	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3884537)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	107	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	98.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	96.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	75.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3884537)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	95.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	95.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	109	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	94.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	89.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	93.0	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3884537) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3884537)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	101	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	105	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	108	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	129	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	86.5	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	89.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3884537)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	91.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	85.0	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878503)							
EP2110016-007	0089_QC102_210830	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	114	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3878502)							
EP2110016-007	0089_QC102_210830	ED045G: Chloride	16887-00-6	1000 mg/L	104	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3884537)							
EP2110017-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	95.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	119	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	111	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	113	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	89.1	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	82.0	53.0	142

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3884537)							
EP2110017-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	100	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	105	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	99.3	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	108	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	109	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	99.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	99.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	90.2	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	88.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	117	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3884537)							
EP2110017-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	115	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	97.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	108	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	118	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	90.9	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	102	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	84.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3884537)							
EP2110017-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	111	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	108	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	120	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	97.2	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110016**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Site	: DEF19009/Stirling	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 12
Order number	: DEF19009/730	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_QC102_210830,	0089_MW233_210830,	**30-Aug-2021**	**----**	----	----	**01-Sep-2021**	13-Sep-2021	✓
0089_QC103_210830,	0089_MW289_210830,							
0089_MW142_210830,	0089_MW149_210830							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_QC102_210830,	0089_MW233_210830,	**30-Aug-2021**	**----**	----	----	**09-Sep-2021**	27-Sep-2021	✓
0089_QC103_210830,	0089_MW289_210830,							
0089_MW142_210830,	0089_MW149_210830							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_QC102_210830,	0089_MW233_210830,	**30-Aug-2021**	**----**	----	----	**09-Sep-2021**	27-Sep-2021	✓
0089_QC103_210830,	0089_MW289_210830,							
0089_MW142_210830,	0089_MW149_210830							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_QC102_210830,	0089_MW233_210830,	**30-Aug-2021**	**----**	----	----	**06-Sep-2021**	06-Sep-2021	✓
0089_QC103_210830,	0089_MW289_210830,							
0089_MW142_210830,	0089_MW149_210830							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_QC301_210830,	0089_QC303_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC302_210830,	0089_QC401_210830,							
0089_QC402_210830,	0089_QC403_210830,							
0089_QC102_210830,	0089_MW233_210830,							
0089_QC103_210830,	0089_MW289_210830,							
0089_MW142_210830,	0089_MW149_210830							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0089_QC301_210830,	0089_QC303_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC302_210830,	0089_QC401_210830,							
0089_QC402_210830,	0089_QC403_210830,							
0089_QC102_210830,	0089_MW233_210830,							
0089_QC103_210830,	0089_MW289_210830,							
0089_MW142_210830,	0089_MW149_210830							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0089_QC301_210830,	0089_QC303_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC302_210830,	0089_QC401_210830,							
0089_QC402_210830,	0089_QC403_210830,							
0089_QC102_210830,	0089_MW233_210830,							
0089_QC103_210830,	0089_MW289_210830,							
0089_MW142_210830,	0089_MW149_210830							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_QC301_210830,	0089_QC303_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC302_210830,	0089_QC401_210830,							
0089_QC402_210830,	0089_QC403_210830,							
0089_QC102_210830,	0089_MW233_210830,							
0089_QC103_210830,	0089_MW289_210830,							
0089_MW142_210830,	0089_MW149_210830							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0089_QC301_210830,	0089_QC303_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC302_210830,	0089_QC401_210830,							
0089_QC402_210830,	0089_QC403_210830,							
0089_QC102_210830,	0089_MW233_210830,							
0089_QC103_210830,	0089_MW289_210830,							
0089_MW142_210830,	0089_MW149_210830							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110016**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 26945	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 31-Aug-2021 13:00	Issue Date	: 01-Sep-2021
Client Requested Due Date	: 10-Sep-2021	Scheduled Reporting Date	: **10-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 9.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110016-001	30-Aug-2021 08:08	0089_QC301_210830		✓		
EP2110016-002	30-Aug-2021 08:10	0089_QC303_210830		✓		
EP2110016-003	30-Aug-2021 08:10	0089_QC302_210830		✓		
EP2110016-004	30-Aug-2021 08:11	0089_QC401_210830		✓		
EP2110016-005	30-Aug-2021 08:12	0089_QC402_210830		✓		
EP2110016-006	30-Aug-2021 08:13	0089_QC403_210830		✓		
EP2110016-007	30-Aug-2021 09:14	0089_QC102_210830	✓	✓	✓	✓
EP2110016-008	30-Aug-2021 09:17	0089_MW233_210830	✓	✓	✓	✓
EP2110016-009	30-Aug-2021 09:37	0089_QC103_210830	✓	✓	✓	✓
EP2110016-010	30-Aug-2021 09:38	0089_MW289_210830	✓	✓	✓	✓
EP2110016-011	30-Aug-2021 11:41	0089_MW142_210830	✓	✓	✓	✓
EP2110016-012	30-Aug-2021 12:00	0089_MW149_210830	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]u

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110016

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: Def19009_0089 **Client:** Department of defence **Project Manager:** [redacted]
Phone:

ALS Compass COC Reference: **# Samples:** **Sampler:**
COC 26947; 26945; 26968; 26949; 26962; 26977; 26951; 26948;
Phone:

Turnaround Requirements: Standard Urgent

Special Instructions:

Custody:

Relinquished by: [redacted]	Received by: [redacted]	Relinquished by:	Received by:
Date / Time: 30/8/21	Date / Time: 31/8 1300	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: **26945** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_QC301		30/08/2021 08:08 AM	Water	ALS: 2 Non ALS: 0	No		X		
002	0089_QC303		30/08/2021 08:10 AM	Water	ALS: 2 Non ALS: 0	No		X		
003	0089_QC302		30/08/2021 08:10 AM	Water	ALS: 2 Non ALS: 0	No		X		
004	0089_QC401		30/08/2021 08:11 AM	Water	ALS: 2 Non ALS: 0	No		X		
005	0089_QC402		30/08/2021 08:12 AM	Water	ALS: 2 Non ALS: 0	No		X		
006	0089_QC403		30/08/2021 08:13 AM	Water	ALS: 2 Non ALS: 0	No		X		
007	0089_QC102		30/08/2021 09:14 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
008	0089_MW233		30/08/2021 09:17 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
009	0089_QC103		30/08/2021 09:37 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			

CHAIN OF CUSTODY

COC#: **26945** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW289		30/08/2021 09:38 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
011	0089_MW142		30/08/2021 11:41 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8			extra PFAS bottles for lab QC
012	0089_MW149		30/08/2021 12:00 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			

CHAIN OF CUSTODY

(ALS) COC#: **26945** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
007	0089_QC102	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW233	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_QC103	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_MW289	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_MW142	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
012	0089_MW149	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **26945** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_QC301	HDPE (no PTFE)	20 mL	00352010040277	Grey	No	
001	0089_QC301	HDPE (no PTFE)	20 mL	00352010040148	Grey	No	
002	0089_QC303	HDPE (no PTFE)	20 mL	00352010040316	Grey	No	
002	0089_QC303	HDPE (no PTFE)	20 mL	00352010040266	Grey	No	
003	0089_QC302	HDPE (no PTFE)	20 mL	00352010040369	Grey	No	
003	0089_QC302	HDPE (no PTFE)	20 mL	00352010040492	Grey	No	
004	0089_QC401	HDPE (no PTFE)	20 mL	00352010040159	Grey	No	
004	0089_QC401	HDPE (no PTFE)	20 mL	00352010040510	Grey	No	
005	0089_QC402	HDPE (no PTFE)	20 mL	00352010040481	Grey	No	
005	0089_QC402	HDPE (no PTFE)	20 mL	00352010040241	Grey	No	
006	0089_QC403	HDPE (no PTFE)	20 mL	00352010040017	Grey	No	
006	0089_QC403	HDPE (no PTFE)	20 mL	00352010040324	Grey	No	
007	0089_QC102	HDPE (no PTFE)	20 mL	00352010011240	Grey	No	
007	0089_QC102	HDPE (no PTFE)	20 mL	00352010011224	Grey	No	
007	0089_QC102	Clear Plastic Bottle - Natural	250 mL	00070520069509	Green	No	
008	0089_MW233	HDPE (no PTFE)	20 mL	00352010011192	Grey	No	
008	0089_MW233	Clear Plastic Bottle - Natural	250 mL	00070520069508	Green	No	
008	0089_MW233	HDPE (no PTFE)	20 mL	00352010011252	Grey	No	
009	0089_QC103	HDPE (no PTFE)	20 mL	00352010011234	Grey	No	
009	0089_QC103	HDPE (no PTFE)	20 mL	00352010011214	Grey	No	
009	0089_QC103	Clear Plastic Bottle - Natural	250 mL	00070520069511	Green	No	
010	0089_MW289	Clear Plastic Bottle - Natural	250 mL	00070520069501	Green	No	
010	0089_MW289	HDPE (no PTFE)	20 mL	00352010011029	Grey	No	
010	0089_MW289	HDPE (no PTFE)	20 mL	00352010011221	Grey	No	
011	0089_MW142	Clear Plastic Bottle - Natural	250 mL	00070520069528	Green	No	
011	0089_MW142	HDPE (no PTFE)	20 mL	00352101017052	Grey	No	

CHAIN OF CUSTODY

COC#: **26945** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

011	0089_MW142	HDPE (no PTFE)	20 mL	00352010011203	Grey	No	
011	0089_MW142	HDPE (no PTFE)	20 mL	00352010011171	Grey	No	
011	0089_MW142	HDPE (no PTFE)	20 mL	00352101017289	Grey	No	
012	0089_MW149	Clear Plastic Bottle - Natural	250 mL	00070520069554	Green	No	
012	0089_MW149	HDPE (no PTFE)	20 mL	00352010011147	Grey	No	
012	0089_MW149	HDPE (no PTFE)	20 mL	00352010011032	Grey	No	

Total Bottle Count: ALS: 32, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110017**	Page	: 1 of 21
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021 13:00
Order number	: DEF19009/730	Date Analysis Commenced	: 01-Sep-2021
C-O-C number	: 26947	Issue Date	: 10-Sep-2021 11:52
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 22		
No. of samples analysed	: 22		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW346_210830	0089_SW373_210830	0089_QC108_210830	0089_SW150_210830	0089_SW152_210830
				Sampling date / time	30-Aug-2021 10:15	30-Aug-2021 10:18	30-Aug-2021 11:00	30-Aug-2021 11:01	30-Aug-2021 11:37
Compound	CAS Number	LOR	Unit		EP2110017-001	EP2110017-002	EP2110017-003	EP2110017-004	EP2110017-007
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		142	134	120	123	105
Total Alkalinity as CaCO3	----	1	mg/L		142	134	120	123	105
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2370	2320	2400	2440	2950
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		16900	16500	17200	17500	17400
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		429	412	420	445	417
Magnesium	7439-95-4	1	mg/L		1290	1270	1290	1370	1300
Sodium	7440-23-5	1	mg/L		9870	9720	9960	10600	10000
Potassium	7440-09-7	1	mg/L		569	559	574	606	577
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		529	516	538	547	554
ø Total Cations	----	0.01	meq/L		571	562	575	612	578
ø Ionic Balance	----	0.01	%		3.87	4.24	3.37	5.58	2.05
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.05	0.03	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		0.34	0.37	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW346_210830	0089_SW373_210830	0089_QC108_210830	0089_SW150_210830	0089_SW152_210830
				Sampling date / time	30-Aug-2021 10:15	30-Aug-2021 10:18	30-Aug-2021 11:00	30-Aug-2021 11:01	30-Aug-2021 11:37
					EP2110017-001	EP2110017-002	EP2110017-003	EP2110017-004	EP2110017-007
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW346_210830	0089_SW373_210830	0089_QC108_210830	0089_SW150_210830	0089_SW152_210830
				Sampling date / time	30-Aug-2021 10:15	30-Aug-2021 10:18	30-Aug-2021 11:00	30-Aug-2021 11:01	30-Aug-2021 11:37
					EP2110017-001	EP2110017-002	EP2110017-003	EP2110017-004	EP2110017-007
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.39**	**0.40**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.39**	**0.40**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.39**	**0.40**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.9**	**104**	**107**	**109**	**105**
13C8-PFOA	----	0.02	%		**88.5**	**91.0**	**88.2**	**88.5**	**90.0**

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SW154_210830	0089_SW156_210830	0089_SW383_210830	0089_SW384_210830	0089_SW353_210830
				Sampling date / time	30-Aug-2021 12:03	30-Aug-2021 12:12	30-Aug-2021 15:40	30-Aug-2021 15:42	30-Aug-2021 15:58
					EP2110017-009	EP2110017-010	EP2110017-013	EP2110017-014	EP2110017-021
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**115**	**116**	**113**	**118**	**116**
Total Alkalinity as CaCO3	----	1	mg/L		**115**	**116**	**113**	**118**	**116**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2440**	**2460**	**2490**	**2480**	**2450**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**17500**	**17400**	**17200**	**17800**	**17600**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**406**	**414**	**420**	**421**	**424**
Magnesium	7439-95-4	1	mg/L		**1270**	**1300**	**1310**	**1320**	**1320**
Sodium	7440-23-5	1	mg/L		**9850**	**10000**	**10100**	**10100**	**10200**
Potassium	7440-09-7	1	mg/L		**566**	**576**	**583**	**586**	**586**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**547**	**544**	**539**	**556**	**550**
ø Total Cations	----	0.01	meq/L		**568**	**577**	**583**	**584**	**588**
ø Ionic Balance	----	0.01	%		**1.88**	**2.94**	**3.90**	**2.44**	**3.40**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.02**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW154_210830	0089_SW156_210830	0089_SW383_210830	0089_SW384_210830	0089_SW353_210830
				Sampling date / time	30-Aug-2021 12:03	30-Aug-2021 12:12	30-Aug-2021 15:40	30-Aug-2021 15:42	30-Aug-2021 15:58
Compound	CAS Number	LOR	Unit		EP2110017-009	EP2110017-010	EP2110017-013	EP2110017-014	EP2110017-021
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW154_210830	0089_SW156_210830	0089_SW383_210830	0089_SW384_210830	0089_SW353_210830
				Sampling date / time	30-Aug-2021 12:03	30-Aug-2021 12:12	30-Aug-2021 15:40	30-Aug-2021 15:42	30-Aug-2021 15:58
Compound	CAS Number	LOR	Unit		EP2110017-009	EP2110017-010	EP2110017-013	EP2110017-014	EP2110017-021
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	**0.02**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.02**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	**0.02**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**94.0**	**100**	**93.4**	**94.7**	**94.0**
13C8-PFOA	----	0.02	%		**90.2**	**91.4**	**86.9**	**84.8**	**85.3**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW382_210830	----	----	----	----
				Sampling date / time	30-Aug-2021 15:59	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110017-022	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**120**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**120**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2480**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**17600**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**434**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**1350**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**10400**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**600**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**550**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**600**	----	----	----	----
ø Ionic Balance	----	0.01	%		**4.34**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.17**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW382_210830	----	----	----	----
				Sampling date / time	30-Aug-2021 15:59	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110017-022	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW382_210830	----	----	----	----
				Sampling date / time	30-Aug-2021 15:59	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110017-022	--------	--------	--------	--------
					Result	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.17**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.17**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.17**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**109**	----	----	----	----
13C8-PFOA	----	0.02	%		**90.8**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW331_210830	0089_PW357_210830	0089_PW330_210830	0089_PW358_210830	0089_PW329_210830
				Sampling date / time	30-Aug-2021 11:12	30-Aug-2021 11:32	30-Aug-2021 11:57	30-Aug-2021 12:15	30-Aug-2021 12:23
					EP2110017-005	EP2110017-006	EP2110017-008	EP2110017-011	EP2110017-012
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**125**	**130**	**148**	**131**	**147**
Total Alkalinity as CaCO3	----	1	mg/L		**125**	**130**	**148**	**131**	**147**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2470**	**2460**	**2570**	**2480**	**2460**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**17400**	**17100**	**17600**	**17100**	**17800**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**443**	**425**	**443**	**457**	**450**
Magnesium	7439-95-4	1	mg/L		**1350**	**1300**	**1330**	**1380**	**1350**
Sodium	7440-23-5	1	mg/L		**10500**	**10000**	**10300**	**10700**	**10400**
Potassium	7440-09-7	1	mg/L		**599**	**572**	**591**	**614**	**600**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**545**	**536**	**553**	**537**	**556**
ø Total Cations	----	0.01	meq/L		**605**	**578**	**595**	**618**	**601**
ø Ionic Balance	----	0.01	%		**5.26**	**3.74**	**3.64**	**7.01**	**3.89**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW331_210830	0089_PW357_210830	0089_PW330_210830	0089_PW358_210830	0089_PW329_210830
				Sampling date / time	30-Aug-2021 11:12	30-Aug-2021 11:32	30-Aug-2021 11:57	30-Aug-2021 12:15	30-Aug-2021 12:23
Compound	CAS Number	LOR	Unit		EP2110017-005	EP2110017-006	EP2110017-008	EP2110017-011	EP2110017-012
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW331_210830	0089_PW357_210830	0089_PW330_210830	0089_PW358_210830	0089_PW329_210830
				Sampling date / time	30-Aug-2021 11:12	30-Aug-2021 11:32	30-Aug-2021 11:57	30-Aug-2021 12:15	30-Aug-2021 12:23
Compound	CAS Number	LOR	Unit		EP2110017-005	EP2110017-006	EP2110017-008	EP2110017-011	EP2110017-012
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.4**	**99.4**	**89.8**	**99.4**	**102**
13C8-PFOA	----	0.02	%		**88.3**	**87.3**	**87.0**	**89.6**	**90.3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW350_210830	0089_PW401_210830	0089_PW352_210830	0089_PW381_210830	0089_PW351_210830
				Sampling date / time	30-Aug-2021 15:45	30-Aug-2021 15:46	30-Aug-2021 15:48	30-Aug-2021 15:49	30-Aug-2021 15:50
Compound	CAS Number	LOR	Unit		EP2110017-015	EP2110017-016	EP2110017-017	EP2110017-018	EP2110017-019
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		119	118	121	119	114
Total Alkalinity as CaCO3	----	1	mg/L		119	118	121	119	114
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2600	2490	2500	2490	2490
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17800	17500	17800	17700	17600
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		431	453	433	462	429
Magnesium	7439-95-4	1	mg/L		1340	1400	1340	1430	1340
Sodium	7440-23-5	1	mg/L		10300	10900	10400	11100	10400
Potassium	7440-09-7	1	mg/L		595	617	594	631	595
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		559	548	556	554	550
ø Total Cations	----	0.01	meq/L		595	628	599	640	599
ø Ionic Balance	----	0.01	%		3.16	6.79	3.71	7.22	4.23
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	0.02	0.02	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW350_210830	0089_PW401_210830	0089_PW352_210830	0089_PW381_210830	0089_PW351_210830
				Sampling date / time	30-Aug-2021 15:45	30-Aug-2021 15:46	30-Aug-2021 15:48	30-Aug-2021 15:49	30-Aug-2021 15:50
Compound	CAS Number	LOR	Unit		EP2110017-015	EP2110017-016	EP2110017-017	EP2110017-018	EP2110017-019
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW350_210830	0089_PW401_210830	0089_PW352_210830	0089_PW381_210830	0089_PW351_210830
				Sampling date / time	30-Aug-2021 15:45	30-Aug-2021 15:46	30-Aug-2021 15:48	30-Aug-2021 15:49	30-Aug-2021 15:50
					EP2110017-015	EP2110017-016	EP2110017-017	EP2110017-018	EP2110017-019
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.02**	**0.02**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.02**	**0.02**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.02**	**0.02**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.8**	**95.4**	**108**	**102**	**100**
13C8-PFOA	----	0.02	%		**86.8**	**85.6**	**87.0**	**87.9**	**89.1**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW380_210830	----	----	----	----
				Sampling date / time	30-Aug-2021 15:52	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110017-020	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**119**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**119**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2470**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**17700**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**429**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**1340**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**10400**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**592**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**553**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**599**	----	----	----	----
ø Ionic Balance	----	0.01	%		**4.00**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**0.06**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.08**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW380_210830	----	----	----	----
				Sampling date / time	30-Aug-2021 15:52	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110017-020	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)				Sample ID	**0089_PW380_210830**	----	----	----	----
				Sampling date / time	30-Aug-2021 15:52	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2110017-020**	--------	--------	--------	--------
					Result	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.14**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.14**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.14**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**93.3**	----	----	----	----
13C8-PFOA	----	0.02	%		**88.4**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110017**	Page	: 1 of 13
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 01-Sep-2021
C-O-C number	: 26947	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 22		
No. of samples analysed	: 22		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3878130)									
EP2110016-012	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	133	132	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	133	132	0.0	0% - 20%
EP2110011-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	251	250	0.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	251	250	0.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3878134)									
EP2110017-009	0089_SW154_210830	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	115	132	13.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	115	132	13.5	0% - 20%
EP2110017-019	0089_PW351_210830	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	114	118	3.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	114	118	3.1	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3878500)									
EP2110017-001	0089_PW346_210830	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2370	2350	1.0	0% - 20%
EP2110017-011	0089_PW358_210830	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2480	2450	1.1	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3878503)									
EP2110016-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11	11	0.0	0% - 50%
EP2110019-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1850	1820	1.4	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 3878501)									
EP2110017-001	0089_PW346_210830	ED045G: Chloride	16887-00-6	1	mg/L	16900	16800	0.8	0% - 20%
EP2110017-011	0089_PW358_210830	ED045G: Chloride	16887-00-6	1	mg/L	17100	17400	1.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3878502)									
EP2110016-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	39	39	0.0	0% - 20%
EP2110019-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	14400	14600	1.3	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3880055)									
EP2110017-001	0089_PW346_210830	ED093F: Calcium	7440-70-2	1	mg/L	429	426	0.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1290	1280	0.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9870	9840	0.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	569	564	0.8	0% - 20%
EP2110017-011	0089_PW358_210830	ED093F: Calcium	7440-70-2	1	mg/L	457	467	2.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1380	1410	2.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10700	11000	2.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	614	625	1.8	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3880056)									
EP2110017-021	0089_SW353_210830	ED093F: Calcium	7440-70-2	1	mg/L	424	436	2.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1320	1350	2.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10200	10400	2.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	586	602	2.6	0% - 20%
EP2110021-009	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	406	405	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1240	1240	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9580	9630	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	556	557	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3884537)									
EP2110016-011	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	2.42	2.51	3.4	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.06	0.08	18.2	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.16	0.17	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	3.24	3.50	7.5	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.11	0.09	21.3	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110017-006	0089_PW357_210830	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3884924)									
EP2110017-009	0089_SW154_210830	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3884924) - continued									
EP2110017-009	0089_SW154_210830	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110017-016	0089_PW401_210830	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3884537)									
EP2110016-011	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.24	0.24	0.0	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.15	0.16	8.3	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.35	1.36	1.3	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110017-006	0089_PW357_210830	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3884924)									
EP2110017-009	0089_SW154_210830	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3884924) - continued									
EP2110017-009	0089_SW154_210830	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110017-016	0089_PW401_210830	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3884537)									
EP2110016-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110017-006	0089_PW357_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3884537) - continued									
EP2110017-006	0089_PW357_210830	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3884924)									
EP2110017-009	0089_SW154_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110017-016	0089_PW401_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3884537)									
EP2110016-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110017-006	0089_PW357_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3884537) - continued									
EP2110017-006	0089_PW357_210830	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3884924)									
EP2110017-009	0089_SW154_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110017-016	0089_PW401_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3884537)									
EP2110016-011	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	7.77	8.15	4.8	0% - 20%
EP2110017-006	0089_PW357_210830	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3884924)									
EP2110017-009	0089_SW154_210830	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110017-016	0089_PW401_210830	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3878130)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	111	81.2	126
				<1	200 mg/L	101	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3878134)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	114	81.2	126
				<1	200 mg/L	99.4	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878500)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.8	87.7	113
				<1	500 mg/L	98.5	87.7	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878503)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	94.2	87.7	113
				<1	500 mg/L	97.5	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3878501)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	92.7	87.9	114
				<1	1000 mg/L	101	87.9	114
ED045G: Chloride by Discrete Analyser (QCLot: 3878502)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	88.8	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3880055)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	110	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	104	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3880056)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.6	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.9	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	107	87.3	118

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3880056) - continued								
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3884537)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	107	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	98.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	96.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	75.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3884924)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	88.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	93.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	83.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	95.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	92.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	104	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3884537)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	95.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	95.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	109	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	94.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	89.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	93.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3884924)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	97.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	97.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	101	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	99.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	89.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	77.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	77.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.8	65.0	144

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3884924) - continued								
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	106	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3884537)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	101	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	105	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	108	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	129	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	86.5	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	89.2	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3884924)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	100	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	97.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	103	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	86.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	92.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	86.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3884537)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	91.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	85.0	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3884924)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	97.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	108	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	88.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	120	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878500)							
EP2110017-001	0089_PW346_210830	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878503)							
EP2110016-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	95.2	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3878501)							
EP2110017-001	0089_PW346_210830	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3878502)							
EP2110016-007	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	96.8	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3884537)							
EP2110017-002	0089_SW373_210830	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	95.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	119	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	111	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	113	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	89.1	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	82.0	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3884924)							
EP2110017-010	0089_SW156_210830	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	88.0	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	97.6	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	87.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	89.8	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	92.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	87.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3884537)							
EP2110017-002	0089_SW373_210830	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	100	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	105	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	99.3	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	108	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	109	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	99.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	99.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	90.2	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	88.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	117	71.0	132

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3884924)							
EP2110017-010	0089_SW156_210830	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	97.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	103	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	96.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	107	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	102	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	98.0	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	89.0	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	85.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	82.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	78.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	106	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3884537)							
EP2110017-002	0089_SW373_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	115	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	97.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	108	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	118	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	90.9	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	102	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	84.2	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3884924)							
EP2110017-010	0089_SW156_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	112	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	75.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	99.4	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	111	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	83.4	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	91.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	81.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3884537)							
EP2110017-002	0089_SW373_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	111	63.0	143

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3884537) - continued							
EP2110017-002	0089_SW373_210830	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	108	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	120	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	97.2	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3884924)							
EP2110017-010	0089_SW156_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	105	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	109	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	95.8	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	74.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110017**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Site	: DEF19009/Stirling	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 22
Order number	: DEF19009/730	No. of samples analysed	: 22

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2110017--001	0089_PW346_210830	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2110017--001	0089_PW346_210830	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_PW346_210830,	0089_SW373_210830,	**30-Aug-2021**	**----**	----	----	**01-Sep-2021**	13-Sep-2021	✓
0089_QC108_210830,	0089_SW150_210830,							
0089_PW331_210830,	0089_PW357_210830,							
0089_SW152_210830,	0089_PW330_210830,							
0089_SW154_210830,	0089_SW156_210830,							
0089_PW358_210830,	0089_PW329_210830,							
0089_SW383_210830,	0089_SW384_210830,							
0089_PW350_210830,	0089_PW401_210830,							
0089_PW352_210830,	0089_PW381_210830,							
0089_PW351_210830,	0089_PW380_210830,							
0089_SW353_210830,	0089_SW382_210830							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_PW346_210830,	0089_SW373_210830,	**30-Aug-2021**	**----**	----	----	**09-Sep-2021**	27-Sep-2021	✓
0089_QC108_210830,	0089_SW150_210830,							
0089_PW331_210830,	0089_PW357_210830,							
0089_SW152_210830,	0089_PW330_210830,							
0089_SW154_210830,	0089_SW156_210830,							
0089_PW358_210830,	0089_PW329_210830,							
0089_SW383_210830,	0089_SW384_210830,							
0089_PW350_210830,	0089_PW401_210830,							
0089_PW352_210830,	0089_PW381_210830,							
0089_PW351_210830,	0089_PW380_210830,							
0089_SW353_210830,	0089_SW382_210830							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_PW346_210830,	0089_SW373_210830,	**30-Aug-2021**	**----**	----	----	**09-Sep-2021**	27-Sep-2021	✓
0089_QC108_210830,	0089_SW150_210830,							
0089_PW331_210830,	0089_PW357_210830,							
0089_SW152_210830,	0089_PW330_210830,							
0089_SW154_210830,	0089_SW156_210830,							
0089_PW358_210830,	0089_PW329_210830,							
0089_SW383_210830,	0089_SW384_210830,							
0089_PW350_210830,	0089_PW401_210830,							
0089_PW352_210830,	0089_PW381_210830,							
0089_PW351_210830,	0089_PW380_210830,							
0089_SW353_210830,	0089_SW382_210830							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_PW346_210830,	0089_SW373_210830,	**30-Aug-2021**	**----**	----	----	**06-Sep-2021**	06-Sep-2021	✓
0089_QC108_210830,	0089_SW150_210830,							
0089_PW331_210830,	0089_PW357_210830,							
0089_SW152_210830,	0089_PW330_210830,							
0089_SW154_210830,	0089_SW156_210830,							
0089_PW358_210830,	0089_PW329_210830,							
0089_SW383_210830,	0089_SW384_210830,							
0089_PW350_210830,	0089_PW401_210830,							
0089_PW352_210830,	0089_PW381_210830,							
0089_PW351_210830,	0089_PW380_210830,							
0089_SW353_210830,	0089_SW382_210830							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_PW346_210830,	0089_SW373_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC108_210830,	0089_SW150_210830,							
0089_PW331_210830,	0089_PW357_210830,							
0089_SW152_210830,	0089_PW330_210830,							
0089_SW154_210830,	0089_SW156_210830,							
0089_PW358_210830,	0089_PW329_210830,							
0089_SW383_210830,	0089_SW384_210830,							
0089_PW350_210830,	0089_PW401_210830,							
0089_PW352_210830,	0089_PW381_210830,							
0089_PW351_210830,	0089_PW380_210830,							
0089_SW353_210830,	0089_SW382_210830							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0089_PW346_210830,	0089_SW373_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC108_210830,	0089_SW150_210830,							
0089_PW331_210830,	0089_PW357_210830,							
0089_SW152_210830,	0089_PW330_210830,							
0089_SW154_210830,	0089_SW156_210830,							
0089_PW358_210830,	0089_PW329_210830,							
0089_SW383_210830,	0089_SW384_210830,							
0089_PW350_210830,	0089_PW401_210830,							
0089_PW352_210830,	0089_PW381_210830,							
0089_PW351_210830,	0089_PW380_210830,							
0089_SW353_210830,	0089_SW382_210830							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0089_PW346_210830,	0089_SW373_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC108_210830,	0089_SW150_210830,							
0089_PW331_210830,	0089_PW357_210830,							
0089_SW152_210830,	0089_PW330_210830,							
0089_SW154_210830,	0089_SW156_210830,							
0089_PW358_210830,	0089_PW329_210830,							
0089_SW383_210830,	0089_SW384_210830,							
0089_PW350_210830,	0089_PW401_210830,							
0089_PW352_210830,	0089_PW381_210830,							
0089_PW351_210830,	0089_PW380_210830,							
0089_SW353_210830,	0089_SW382_210830							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW346_210830, 0089_QC108_210830, 0089_PW331_210830, 0089_SW152_210830, 0089_SW154_210830, 0089_PW358_210830, 0089_SW383_210830, 0089_PW350_210830, 0089_PW352_210830, 0089_PW351_210830, 0089_SW353_210830, 0089_SW373_210830, 0089_SW150_210830, 0089_PW357_210830, 0089_PW330_210830, 0089_SW156_210830, 0089_PW329_210830, 0089_SW384_210830, 0089_PW401_210830, 0089_PW381_210830, 0089_PW380_210830, 0089_SW382_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW346_210830, 0089_QC108_210830, 0089_PW331_210830, 0089_SW152_210830, 0089_SW154_210830, 0089_PW358_210830, 0089_SW383_210830, 0089_PW350_210830, 0089_PW352_210830, 0089_PW351_210830, 0089_SW353_210830, 0089_SW373_210830, 0089_SW150_210830, 0089_PW357_210830, 0089_PW330_210830, 0089_SW156_210830, 0089_PW329_210830, 0089_SW384_210830, 0089_PW401_210830, 0089_PW381_210830, 0089_PW380_210830, 0089_SW382_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110017**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 26947	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 31-Aug-2021 13:00	Issue Date	: 01-Sep-2021
Client Requested Due Date	: 10-Sep-2021	Scheduled Reporting Date	: **10-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 9.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 22 / 22

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110017-001	30-Aug-2021 10:15	0089_PW346_210830	✓	✓	✓	✓
EP2110017-002	30-Aug-2021 10:18	0089_SW373_210830	✓	✓	✓	✓
EP2110017-003	30-Aug-2021 11:00	0089_QC108_210830	✓	✓	✓	✓
EP2110017-004	30-Aug-2021 11:01	0089_SW150_210830	✓	✓	✓	✓
EP2110017-005	30-Aug-2021 11:12	0089_PW331_210830	✓	✓	✓	✓
EP2110017-006	30-Aug-2021 11:32	0089_PW357_210830	✓	✓	✓	✓
EP2110017-007	30-Aug-2021 11:37	0089_SW152_210830	✓	✓	✓	✓
EP2110017-008	30-Aug-2021 11:57	0089_PW330_210830	✓	✓	✓	✓
EP2110017-009	30-Aug-2021 12:03	0089_SW154_210830	✓	✓	✓	✓
EP2110017-010	30-Aug-2021 12:12	0089_SW156_210830	✓	✓	✓	✓
EP2110017-011	30-Aug-2021 12:15	0089_PW358_210830	✓	✓	✓	✓
EP2110017-012	30-Aug-2021 12:23	0089_PW329_210830	✓	✓	✓	✓
EP2110017-013	30-Aug-2021 15:40	0089_SW383_210830	✓	✓	✓	✓
EP2110017-014	30-Aug-2021 15:42	0089_SW384_210830	✓	✓	✓	✓
EP2110017-015	30-Aug-2021 15:45	0089_PW350_210830	✓	✓	✓	✓
EP2110017-016	30-Aug-2021 15:46	0089_PW401_210830	✓	✓	✓	✓
EP2110017-017	30-Aug-2021 15:48	0089_PW352_210830	✓	✓	✓	✓
EP2110017-018	30-Aug-2021 15:49	0089_PW381_210830	✓	✓	✓	✓
EP2110017-019	30-Aug-2021 15:50	0089_PW351_210830	✓	✓	✓	✓
EP2110017-020	30-Aug-2021 15:52	0089_PW380_210830	✓	✓	✓	✓
EP2110017-021	30-Aug-2021 15:58	0089_SW353_210830	✓	✓	✓	✓
EP2110017-022	30-Aug-2021 15:59	0089_SW382_210830	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]cardno.com.au

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)	Email	[redacted]

[redacted]

- A4 - AU Tax Invoice (INV)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110017

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: Def19009_0039 **Client:** Department of defence. **Project Manager** [redacted]
Phone:

ALS Compass COC Reference: **# Samples:** **Sampler:**
COC 26947, 26945, 26968, 26949, 26962, 26977, 26951, 26948.
Phone:

Turnaround Requirements: Standard Urgent

Special Instructions:

[redacted]

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 30/8/21	Date / Time: 31/8 1300	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: **26947** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW346		30/08/2021 10:15 AM	Water	ALS: 3 Non ALS: 0	No	Partial 7/8		
002	0089_SW373		30/08/2021 10:18 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS bottles for lab QC
003	0089_QC108		30/08/2021 11:00 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0089_SW150		30/08/2021 11:01 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0089_PW331		30/08/2021 11:12 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0089_PW357		30/08/2021 11:32 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC sampled
007	0089_SW152		30/08/2021 11:37 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC samples collected
008	0089_PW330		30/08/2021 11:57 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
009	0089_SW154		30/08/2021 12:03 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC samples collected

CHAIN OF CUSTODY

COC#: **26947** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SW156		30/08/2021 12:12 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC samples collected
011	0089_PW358		30/08/2021 12:15 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
012	0089_PW329		30/08/2021 12:23 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC samples collected
013	0089_SW383		30/08/2021 03:40 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
014	0089_SW384		30/08/2021 03:42 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC samples collected
015	0089_PW350		30/08/2021 03:45 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
016	0089_PW401		30/08/2021 03:46 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC samples collected
017	0089_PW352		30/08/2021 03:48 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
018	0089_PW381		30/08/2021 03:49 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

(ALS) COC#: **26947** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	0089_PW351		30/08/2021 03:50 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
020	0089_PW380		30/08/2021 03:52 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
021	0089_SW353		30/08/2021 03:58 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
022	0089_SW382		30/08/2021 03:59 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

COC#: **26947** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW346	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_SW373	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_QC108	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW150	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_PW331	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0089_PW357	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_SW152	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_PW330	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_SW154	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **26947** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

010	0089_SW156	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_PW358	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
012	0089_PW329	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
013	0089_SW383	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
014	0089_SW384	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
015	0089_PW350	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
016	0089_PW401	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
017	0089_PW352	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
018	0089_PW381	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
019	0089_PW351	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **26947** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

020	0089_PW380	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
021	0089_SW353	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
022	0089_SW382	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 26947 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW346	HDPE (no PTFE)	20 mL	00352010011197	Grey	No	
001	0089_PW346	HDPE (no PTFE)	20 mL	00352010011273	Grey	No	
001	0089_PW346	Clear Plastic Bottle - Natural	250 mL	00070520069510	Green	No	
002	0089_SW373	Clear Plastic Bottle - Natural	250 mL	00070520069462	Green	No	
002	0089_SW373	HDPE (no PTFE)	20 mL	00352010040199	Grey	No	
002	0089_SW373	HDPE (no PTFE)	20 mL	00352010011254	Grey	No	
002	0089_SW373	HDPE (no PTFE)	20 mL	00352010011257	Grey	No	
002	0089_SW373	HDPE (no PTFE)	20 mL	00352010040317	Grey	No	
003	0089_QC108	Clear Plastic Bottle - Natural	250 mL	00070520069591	Green	No	
003	0089_QC108	HDPE (no PTFE)	20 mL	00352010011242	Grey	No	
003	0089_QC108	HDPE (no PTFE)	20 mL	00352010011035	Grey	No	
004	0089_SW150	Clear Plastic Bottle - Natural	250 mL	00070520069555	Green	No	
004	0089_SW150	HDPE (no PTFE)	20 mL	00352010011036	Grey	No	
004	0089_SW150	HDPE (no PTFE)	20 mL	00352010011340	Grey	No	
005	0089_PW331	Clear Plastic Bottle - Natural	250 mL	00070520069524	Green	No	
005	0089_PW331	HDPE (no PTFE)	20 mL	00352010011110	Grey	No	
005	0089_PW331	HDPE (no PTFE)	20 mL	00352010011098	Grey	No	
006	0089_PW357	HDPE (no PTFE)	20 mL	00352101017192	Grey	No	
006	0089_PW357	HDPE (no PTFE)	20 mL	00352101017104	Grey	No	
006	0089_PW357	Clear Plastic Bottle - Natural	250 mL	00070520069488	Green	No	
006	0089_PW357	HDPE (no PTFE)	20 mL	00352010011319	Grey	No	
006	0089_PW357	HDPE (no PTFE)	20 mL	00352010011279	Grey	No	
007	0089_SW152	Clear Plastic Bottle - Natural	250 mL	00070520069541	Green	No	
007	0089_SW152	HDPE (no PTFE)	20 mL	00352010011143	Grey	No	
007	0089_SW152	HDPE (no PTFE)	20 mL	00352010011366	Grey	No	
007	0089_SW152	HDPE (no PTFE)	20 mL	00352101017154	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: 26947 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_SW152	HDPE (no PTFE)	20 mL	00352102020634	Grey	No	
008	0089_PW330	Clear Plastic Bottle - Natural	250 mL	00070520069560	Green	No	
008	0089_PW330	HDPE (no PTFE)	20 mL	00352010011129	Grey	No	
008	0089_PW330	HDPE (no PTFE)	20 mL	00352010010919	Grey	No	
009	0089_SW154	HDPE (no PTFE)	20 mL	00352101016889	Grey	No	
009	0089_SW154	HDPE (no PTFE)	20 mL	00352101017228	Grey	No	
009	0089_SW154	HDPE (no PTFE)	20 mL	00352010011301	Grey	No	
009	0089_SW154	HDPE (no PTFE)	20 mL	00352010011339	Grey	No	
009	0089_SW154	Clear Plastic Bottle - Natural	250 mL	00070520069516	Green	No	
010	0089_SW156	HDPE (no PTFE)	20 mL	00352101020539	Grey	No	
010	0089_SW156	HDPE (no PTFE)	20 mL	00352101017040	Grey	No	
010	0089_SW156	Clear Plastic Bottle - Natural	250 mL	00070520069502	Green	No	
010	0089_SW156	HDPE (no PTFE)	20 mL	00352010011225	Grey	No	
010	0089_SW156	HDPE (no PTFE)	20 mL	00352010011347	Grey	No	
011	0089_PW358	Clear Plastic Bottle - Natural	250 mL	00070520069491	Green	No	
011	0089_PW358	HDPE (no PTFE)	20 mL	00352010011258	Grey	No	
011	0089_PW358	HDPE (no PTFE)	20 mL	00352010011217	Grey	No	
012	0089_PW329	Clear Plastic Bottle - Natural	250 mL	00070520069529	Green	No	
012	0089_PW329	HDPE (no PTFE)	20 mL	00352010011116	Grey	No	
012	0089_PW329	HDPE (no PTFE)	20 mL	00352101017199	Grey	No	
012	0089_PW329	HDPE (no PTFE)	20 mL	00352101016978	Grey	No	
012	0089_PW329	HDPE (no PTFE)	20 mL	00352101017109	Grey	No	
013	0089_SW383	HDPE (no PTFE)	20 mL	00352010011164	Grey	No	
013	0089_SW383	Clear Plastic Bottle - Natural	250 mL	00070520069518	Green	No	
013	0089_SW383	HDPE (no PTFE)	20 mL	00352010011284	Grey	No	
014	0089_SW384	Clear Plastic Bottle - Natural	250 mL	00070520069480	Green	No	
014	0089_SW384	HDPE (no PTFE)	20 mL	00352101017069	Grey	No	

CHAIN OF CUSTODY

COC#: **26947** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

014	0089_SW384	HDPE (no PTFE)	20 mL	00352010011299	Grey	No	
014	0089_SW384	HDPE (no PTFE)	20 mL	00352101017156	Grey	No	
014	0089_SW384	HDPE (no PTFE)	20 mL	00352010011253	Grey	No	
015	0089_PW350	HDPE (no PTFE)	20 mL	00352010011210	Grey	No	
015	0089_PW350	HDPE (no PTFE)	20 mL	00352010011174	Grey	No	
015	0089_PW350	Clear Plastic Bottle - Natural	250 mL	00070520069493	Green	No	
016	0089_PW401	HDPE (no PTFE)	20 mL	00352101016973	Grey	No	
016	0089_PW401	HDPE (no PTFE)	20 mL	00352010011166	Grey	No	
016	0089_PW401	HDPE (no PTFE)	20 mL	00352010011207	Grey	No	
016	0089_PW401	HDPE (no PTFE)	20 mL	00352101017034	Grey	No	
016	0089_PW401	Clear Plastic Bottle - Natural	250 mL	00070520069472	Green	No	
017	0089_PW352	HDPE (no PTFE)	20 mL	00352010011334	Grey	No	
017	0089_PW352	HDPE (no PTFE)	20 mL	00352010011324	Grey	No	
017	0089_PW352	Clear Plastic Bottle - Natural	250 mL	00070520069504	Green	No	
018	0089_PW381	HDPE (no PTFE)	20 mL	00352010011305	Grey	No	
018	0089_PW381	HDPE (no PTFE)	20 mL	00352010011128	Grey	No	
018	0089_PW381	Clear Plastic Bottle - Natural	250 mL	00070520069479	Green	No	
019	0089_PW351	HDPE (no PTFE)	20 mL	00352010011151	Grey	No	
019	0089_PW351	HDPE (no PTFE)	20 mL	00352010011318	Grey	No	
019	0089_PW351	Clear Plastic Bottle - Natural	250 mL	00070520069495	Green	No	
020	0089_PW380	Clear Plastic Bottle - Natural	250 mL	00070520069507	Green	No	
020	0089_PW380	HDPE (no PTFE)	20 mL	00352010011236	Grey	No	
020	0089_PW380	HDPE (no PTFE)	20 mL	00352010011330	Grey	No	
021	0089_SW353	HDPE (no PTFE)	20 mL	00350019025011	Grey	No	
021	0089_SW353	HDPE (no PTFE)	20 mL	00350019025012	Grey	No	
021	0089_SW353	Clear Plastic Bottle - Natural	250 mL	00070520069573	Green	No	
022	0089_SW382	HDPE (no PTFE)	20 mL	00350019047342	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 26947 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO [redacted]

EMAIL INVOICES TO

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

022	0089_SW382	HDPE (no PTFE)	20 mL	00350019047374	Grey	No	
022	0089_SW382	Clear Plastic Bottle - Natural	250 mL	00070520069565	Green	No	

Total Bottle Count: ALS: 82, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110018**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021 13:00
Order number	: DEF19009/730	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 26948	Issue Date	: 10-Sep-2021 08:15
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 15		
No. of samples analysed	: 15		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD346_210830	0089_QC105_210830	0089_SD357_210830	0089_QC109_210830	0089_SD331_210830
				Sampling date / time	30-Aug-2021 10:12	30-Aug-2021 10:13	30-Aug-2021 11:05	30-Aug-2021 11:05	30-Aug-2021 11:18
					EP2110018-001	EP2110018-002	EP2110018-003	EP2110018-004	EP2110018-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**26.4**	**27.2**	**14.7**	**21.1**	**29.2**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0024**	**0.0022**	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD346_210830	0089_QC105_210830	0089_SD357_210830	0089_QC109_210830	0089_SD331_210830
				Sampling date / time	30-Aug-2021 10:12	30-Aug-2021 10:13	30-Aug-2021 11:05	30-Aug-2021 11:05	30-Aug-2021 11:18
Compound	CAS Number	LOR	Unit		EP2110018-001	EP2110018-002	EP2110018-003	EP2110018-004	EP2110018-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0024**	**0.0022**	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0024**	**0.0022**	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0024**	**0.0022**	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**110**	**85.5**	**86.5**	**91.0**	**104**
13C8-PFOA	----	0.0002	%		**120**	**118**	**117**	**115**	**118**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD330_210830	0089_SD358_210830	0089_SD329_210830	0089_SD350_210830	0089_SD351_210830
			Sampling date / time	30-Aug-2021 11:54	30-Aug-2021 12:17	30-Aug-2021 12:28	30-Aug-2021 15:43	30-Aug-2021 15:50
Compound	CAS Number	LOR	Unit	EP2110018-006	EP2110018-007	EP2110018-008	EP2110018-009	EP2110018-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**17.2**	**11.6**	**22.0**	**12.8**	**17.8**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0002**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD330_210830	0089_SD358_210830	0089_SD329_210830	0089_SD350_210830	0089_SD351_210830
				Sampling date / time	30-Aug-2021 11:54	30-Aug-2021 12:17	30-Aug-2021 12:28	30-Aug-2021 15:43	30-Aug-2021 15:50
					EP2110018-006	EP2110018-007	EP2110018-008	EP2110018-009	EP2110018-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0002**	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0002**	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0002**	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**100**	**92.0**	**95.0**	**102**	**104**
13C8-PFOA	----	0.0002	%		**119**	**118**	**120**	**116**	**118**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD380_210830	0089_SD401_210830	0089_SD381_210830	0089_SD352_210830	0089_SD356_210830
			Sampling date / time	30-Aug-2021 15:51	30-Aug-2021 15:52	30-Aug-2021 15:53	30-Aug-2021 15:54	30-Aug-2021 00:00
Compound	CAS Number	LOR	Unit	EP2110018-011	EP2110018-012	EP2110018-013	EP2110018-014	EP2110018-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**18.4**	**19.6**	**16.0**	**15.0**	**23.7**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD380_210830	0089_SD401_210830	0089_SD381_210830	0089_SD352_210830	0089_SD356_210830
				Sampling date / time	30-Aug-2021 15:51	30-Aug-2021 15:52	30-Aug-2021 15:53	30-Aug-2021 15:54	30-Aug-2021 00:00
Compound	CAS Number	LOR	Unit		EP2110018-011	EP2110018-012	EP2110018-013	EP2110018-014	EP2110018-015
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**90.5**	**88.5**	**95.0**	**94.5**	**88.0**
13C8-PFOA	----	0.0002	%		**98.5**	**98.0**	**96.5**	**101**	**95.5**

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110018**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 26948	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 15		
No. of samples analysed	: 15		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3891683)									
EP2110018-001	0089_SD346_210830	EA055: Moisture Content	----	0.1	%	26.4	26.3	0.0	0% - 20%
EP2110018-012	0089_SD401_210830	EA055: Moisture Content	----	0.1	%	19.6	19.6	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3885850)									
EB2124811-031	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2110018-005	0089_SD331_210830	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3885861)									
EP2110018-011	0089_SD380_210830	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2110023-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3885861) - continued									
EP2110023-003	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3885850)									
EB2124811-031	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2110018-005	0089_SD331_210830	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3885861)									
EP2110018-011	0089_SD380_210830	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2110023-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3885861) - continued									
EP2110023-003	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3885850)									
EB2124811-031	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110018-005	0089_SD331_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3885861)									
EP2110018-011	0089_SD380_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3885861) - continued									
EP2110018-011	0089_SD380_210830	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110023-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3885850)									
EB2124811-031	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110018-005	0089_SD331_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3885861)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3885861) - continued									
EP2110018-011	0089_SD380_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110023-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885850)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	66.4	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885861)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885850)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	98.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885861)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	82.0	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.4	64.0	136

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885861) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885850)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.8	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.3	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885861)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.2	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.7	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.6	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	91.5	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.0	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885850)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	102	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	103	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	80.4	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	70.0	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885861)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	127	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	87.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	87.6	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	84.0	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885850)							
EB2124811-031	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	102	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	109	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	99.2	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	99.2	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	102	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	96.0	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885861)							
EP2110018-011	0089_SD380_210830	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	73.6	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	85.2	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	78.8	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	83.2	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	76.0	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	85.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885850)							
EB2124811-031	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	98.8	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	110	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	110	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	112	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	99.2	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	107	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	98.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	84.4	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	107	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	108	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	114	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885861)							
EP2110018-011	0089_SD380_210830	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	77.8	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	84.8	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	84.4	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	95.6	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	88.8	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	90.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	84.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	81.6	64.0	136

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885861) - continued							
EP2110018-011	0089_SD380_210830	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	78.4	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	70.0	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	96.8	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885850)							
EB2124811-031	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	92.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	111	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	117	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	101	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	94.9	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	107	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	75.2	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885861)							
EP2110018-011	0089_SD380_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	78.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	78.4	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	86.7	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	80.8	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	84.9	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	92.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	84.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885850)							
EB2124811-031	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	105	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	82.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	104	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	71.6	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885861)							
EP2110018-011	0089_SD380_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	77.6	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	82.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	89.6	65.0	137

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885861) - continued							
EP2110018-011	0089_SD380_210830	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	84.4	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110018**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Site	: DEF19009/Stirling	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 15
Order number	: DEF19009/730	No. of samples analysed	: 15

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055)								
0089_SD346_210830,	0089_QC105_210830,	**30-Aug-2021**	**----**	----	----	**08-Sep-2021**	13-Sep-2021	✓
0089_SD357_210830,	0089_QC109_210830,							
0089_SD331_210830,	0089_SD330_210830,							
0089_SD358_210830,	0089_SD329_210830,							
0089_SD350_210830,	0089_SD351_210830,							
0089_SD380_210830,	0089_SD401_210830,							
0089_SD381_210830,	0089_SD352_210830,							
0089_SD356_210830								
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0089_SD346_210830,	0089_QC105_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**06-Sep-2021**	16-Oct-2021	✓
0089_SD357_210830,	0089_QC109_210830,							
0089_SD331_210830,	0089_SD330_210830,							
0089_SD358_210830,	0089_SD329_210830,							
0089_SD350_210830,	0089_SD351_210830							
HDPE Soil Jar (EP231X)								
0089_SD380_210830,	0089_SD401_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
0089_SD381_210830,	0089_SD352_210830,							
0089_SD356_210830								
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
0089_SD346_210830,	0089_QC105_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**06-Sep-2021**	16-Oct-2021	✓
0089_SD357_210830,	0089_QC109_210830,							
0089_SD331_210830,	0089_SD330_210830,							
0089_SD358_210830,	0089_SD329_210830,							
0089_SD350_210830,	0089_SD351_210830							
HDPE Soil Jar (EP231X)								
0089_SD380_210830,	0089_SD401_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
0089_SD381_210830,	0089_SD352_210830,							
0089_SD356_210830								

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) 0089_SD346_210830, 0089_QC105_210830, 0089_SD357_210830, 0089_QC109_210830, 0089_SD331_210830, 0089_SD330_210830, 0089_SD358_210830, 0089_SD329_210830, 0089_SD350_210830, 0089_SD351_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**06-Sep-2021**	16-Oct-2021	✓
HDPE Soil Jar (EP231X) 0089_SD380_210830, 0089_SD401_210830, 0089_SD381_210830, 0089_SD352_210830, 0089_SD356_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) 0089_SD346_210830, 0089_QC105_210830, 0089_SD357_210830, 0089_QC109_210830, 0089_SD331_210830, 0089_SD330_210830, 0089_SD358_210830, 0089_SD329_210830, 0089_SD350_210830, 0089_SD351_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**06-Sep-2021**	16-Oct-2021	✓
HDPE Soil Jar (EP231X) 0089_SD380_210830, 0089_SD401_210830, 0089_SD381_210830, 0089_SD352_210830, 0089_SD356_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) 0089_SD346_210830, 0089_QC105_210830, 0089_SD357_210830, 0089_QC109_210830, 0089_SD331_210830, 0089_SD330_210830, 0089_SD358_210830, 0089_SD329_210830, 0089_SD350_210830, 0089_SD351_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**06-Sep-2021**	16-Oct-2021	✓
HDPE Soil Jar (EP231X) 0089_SD380_210830, 0089_SD401_210830, 0089_SD381_210830, 0089_SD352_210830, 0089_SD356_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110018**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 26948	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 31-Aug-2021 13:00	Issue Date	: 01-Sep-2021
Client Requested Due Date	: 10-Sep-2021	Scheduled Reporting Date	: **10-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 9.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 15 / 15

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2110018-001	30-Aug-2021 10:12	0089_SD346_210830	✓	✓
EP2110018-002	30-Aug-2021 10:13	0089_QC105_210830	✓	✓
EP2110018-003	30-Aug-2021 11:05	0089_SD357_210830	✓	✓
EP2110018-004	30-Aug-2021 11:05	0089_QC109_210830	✓	✓
EP2110018-005	30-Aug-2021 11:18	0089_SD331_210830	✓	✓
EP2110018-006	30-Aug-2021 11:54	0089_SD330_210830	✓	✓
EP2110018-007	30-Aug-2021 12:17	0089_SD358_210830	✓	✓
EP2110018-008	30-Aug-2021 12:28	0089_SD329_210830	✓	✓
EP2110018-009	30-Aug-2021 15:43	0089_SD350_210830	✓	✓
EP2110018-010	30-Aug-2021 15:50	0089_SD351_210830	✓	✓
EP2110018-011	30-Aug-2021 15:51	0089_SD380_210830	✓	✓
EP2110018-012	30-Aug-2021 15:52	0089_SD401_210830	✓	✓
EP2110018-013	30-Aug-2021 15:53	0089_SD381_210830	✓	✓
EP2110018-014	30-Aug-2021 15:54	0089_SD352_210830	✓	✓
EP2110018-015	30-Aug-2021 00:00	0089_SD356_210830	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110018

Telephone : - 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: Def19009_0039 **Client:** Department of defence. **Project Mana** [redacted]
Phone:

ALS Compass COC Reference: _____ **# Samples:** _____ **Sampler:** _____
Phone:

COC 26947; 26945; 26968; 26949; 26962; 26977; 26951
26948;

Turnaround Requirements: Standard _____ Urgent _____

Special Instructions:

[redacted]

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 30/8/21	**Date / Time:** 31/8 1300	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

COC#: 26948 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS | **ANALYSIS REQUIRED**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD346		30/08/2021 10:12 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
002	0089_QC105		30/08/2021 10:13 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
003	0089_SD357		30/08/2021 11:05 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
004	0089_QC109		30/08/2021 11:05 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
005	0089_SD331		30/08/2021 11:18 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
006	0089_SD330		30/08/2021 11:54 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
007	0089_SD358		30/08/2021 12:17 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
008	0089_SD329		30/08/2021 12:28 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
009	0089_SD350		30/08/2021 03:43 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		

CHAIN OF CUSTODY

ALS COC#: **26948** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SD351		30/08/2021 03:50 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
011	0089_SD380		30/08/2021 03:51 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
012	0089_SD401		30/08/2021 03:52 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
013	0089_SD381		30/08/2021 03:53 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
014	0089_SD352		30/08/2021 03:54 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		

15 SD 356 30/8 1/4

CHAIN OF CUSTODY

(ALS) COC#: **26948** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:
QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SD346	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
002	0089_QC105	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
003	0089_SD357	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
004	0089_QC109	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
005	0089_SD331	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
006	0089_SD330	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
007	0089_SD358	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
008	0089_SD329	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
009	0089_SD350	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
010	0089_SD351	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
011	0089_SD380	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
012	0089_SD401	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
013	0089_SD381	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
014	0089_SD352	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **26948** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD346	HDPE Soil Jar	200 mL	00621019025007	Grey	No	
002	0089_QC105	HDPE Soil Jar	200 mL	00621019025121	Grey	No	
003	0089_SD357	HDPE Soil Jar	200 mL	00621019025116	Grey	No	
004	0089_QC109	HDPE Soil Jar	200 mL	00621019025046	Grey	No	
005	0089_SD331	HDPE Soil Jar	200 mL	00621019025035	Grey	No	
006	0089_SD330	HDPE Soil Jar	200 mL	00621019025115	Grey	No	
007	0089_SD358	HDPE Soil Jar	200 mL	00621019025009	Grey	No	
008	0089_SD329	HDPE Soil Jar	200 mL	00621019025093	Grey	No	
009	0089_SD350	HDPE Soil Jar	200 mL	00621019025099	Grey	No	
010	0089_SD351	HDPE Soil Jar	200 mL	00621019025142	Grey	No	
011	0089_SD380	HDPE Soil Jar	200 mL	00621019025029	Grey	No	
012	0089_SD401	HDPE Soil Jar	200 mL	00621019025129	Grey	No	
013	0089_SD381	HDPE Soil Jar	200 mL	00621019025021	Grey	No	
014	0089_SD352	HDPE Soil Jar	200 mL	00621019025039	Grey	No	

Total Bottle Count: ALS: 14, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110019**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021 13:00
Order number	: DEF19009/730	Date Analysis Commenced	: 01-Sep-2021
C-O-C number	: 26949	Issue Date	: 10-Sep-2021 12:12
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW124_210830	0089_MW125_210830	0089_QC101_210830	0089_MW126_210830	0089_MW127_210830
				Sampling date / time	30-Aug-2021 09:00	30-Aug-2021 09:22	30-Aug-2021 09:22	30-Aug-2021 09:34	30-Aug-2021 09:42
Compound	CAS Number	LOR	Unit		EP2110019-001	EP2110019-002	EP2110019-003	EP2110019-004	EP2110019-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		390	441	416	594	559
Total Alkalinity as CaCO3	----	1	mg/L		390	441	416	594	559
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1700	1890	1850	1600	1640
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		13800	15200	14400	14300	13600
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		440	476	469	454	408
Magnesium	7439-95-4	1	mg/L		1120	1300	1260	1220	1190
Sodium	7440-23-5	1	mg/L		8410	9470	9210	8560	8280
Potassium	7440-09-7	1	mg/L		405	459	448	403	398
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		432	477	453	448	429
ø Total Cations	----	0.01	meq/L		490	554	539	506	489
ø Ionic Balance	----	0.01	%		6.27	7.51	8.68	5.99	6.50
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.06	0.06	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.07	0.07	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	0.26	0.26	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	0.02	0.02	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	0.05	0.05	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW124_210830	0089_MW125_210830	0089_QC101_210830	0089_MW126_210830	0089_MW127_210830
				Sampling date / time	30-Aug-2021 09:00	30-Aug-2021 09:22	30-Aug-2021 09:22	30-Aug-2021 09:34	30-Aug-2021 09:42
					EP2110019-001	EP2110019-002	EP2110019-003	EP2110019-004	EP2110019-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW124_210830	0089_MW125_210830	0089_QC101_210830	0089_MW126_210830	0089_MW127_210830
				Sampling date / time	30-Aug-2021 09:00	30-Aug-2021 09:22	30-Aug-2021 09:22	30-Aug-2021 09:34	30-Aug-2021 09:42
					EP2110019-001	EP2110019-002	EP2110019-003	EP2110019-004	EP2110019-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.46**	**0.46**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.28**	**0.28**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.39**	**0.39**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**96.5**	**102**	**95.8**	**101**
13C8-PFOA	----	0.02	%		**86.5**	**89.5**	**88.2**	**88.8**	**89.4**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW166_210830	0089_MW171_210830	0089_MW196_210830	0089_QC112_210830	0089_MW199_210830
				Sampling date / time	30-Aug-2021 12:39	30-Aug-2021 12:46	30-Aug-2021 14:19	30-Aug-2021 14:19	30-Aug-2021 14:37
Compound	CAS Number	LOR	Unit		EP2110019-006	EP2110019-007	EP2110019-008	EP2110019-009	EP2110019-010
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**363**	**452**	**219**	**212**	**345**
Total Alkalinity as CaCO3	----	1	mg/L		**363**	**452**	**219**	**212**	**345**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**156**	**528**	**24**	**22**	**59**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**908**	**4200**	**32**	**30**	**221**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**132**	**195**	**73**	**70**	**70**
Magnesium	7439-95-4	1	mg/L		**96**	**381**	**20**	**20**	**46**
Sodium	7440-23-5	1	mg/L		**493**	**2550**	**24**	**24**	**139**
Potassium	7440-09-7	1	mg/L		**41**	**104**	**2**	**2**	**10**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**36.1**	**138**	**5.78**	**5.54**	**14.4**
ø Total Cations	----	0.01	meq/L		**37.0**	**155**	**6.38**	**6.23**	**13.6**
ø Ionic Balance	----	0.01	%		**1.18**	**5.51**	**4.98**	**5.90**	**2.77**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.03**	**0.14**	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.04**	**0.08**	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**0.95**	**0.35**	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.22**	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**8.16**	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.29**	**0.06**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.26**	**0.19**	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.14**	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW166_210830	0089_MW171_210830	0089_MW196_210830	0089_QC112_210830	0089_MW199_210830
				Sampling date / time	30-Aug-2021 12:39	30-Aug-2021 12:46	30-Aug-2021 14:19	30-Aug-2021 14:19	30-Aug-2021 14:37
Compound	CAS Number	LOR	Unit		EP2110019-006	EP2110019-007	EP2110019-008	EP2110019-009	EP2110019-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.09**	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW166_210830	0089_MW171_210830	0089_MW196_210830	0089_QC112_210830	0089_MW199_210830
				Sampling date / time	30-Aug-2021 12:39	30-Aug-2021 12:46	30-Aug-2021 14:19	30-Aug-2021 14:19	30-Aug-2021 14:37
					EP2110019-006	EP2110019-007	EP2110019-008	EP2110019-009	EP2110019-010
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**10.2**	**0.82**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**9.11**	**0.35**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**9.92**	**0.74**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.4**	**97.3**	**93.5**	**101**	**91.4**
13C8-PFOA	----	0.02	%		**86.4**	**93.1**	**90.9**	**91.4**	**87.5**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW203_210830	0089_MW202_210830	----	----	----
				Sampling date / time	30-Aug-2021 15:01	30-Aug-2021 15:36	----	----	----
Compound	CAS Number	LOR	Unit		EP2110019-011	EP2110019-012	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**292**	**356**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**292**	**356**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**43**	**59**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**44**	**245**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**75**	**100**	----	----	----
Magnesium	7439-95-4	1	mg/L		**37**	**22**	----	----	----
Sodium	7440-23-5	1	mg/L		**40**	**156**	----	----	----
Potassium	7440-09-7	1	mg/L		**4**	**12**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**7.97**	**15.2**	----	----	----
ø Total Cations	----	0.01	meq/L		**8.63**	**13.9**	----	----	----
ø Ionic Balance	----	0.01	%		**3.97**	**4.66**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.02**	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**0.09**	**0.04**	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.04**	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW203_210830	0089_MW202_210830	----	----	----
				Sampling date / time	30-Aug-2021 15:01	30-Aug-2021 15:36	----	----	----
Compound	CAS Number	LOR	Unit		EP2110019-011	EP2110019-012	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW203_210830	0089_MW202_210830	----	----	----
				Sampling date / time	30-Aug-2021 15:01	30-Aug-2021 15:36	----	----	----
Compound	CAS Number	LOR	Unit		EP2110019-011	EP2110019-012	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.11**	**0.08**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.09**	**0.08**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.09**	**0.08**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**93.0**	**102**	----	----	----
13C8-PFOA	----	0.02	%		**88.9**	**88.9**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110019**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 01-Sep-2021
C-O-C number	: 26949	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3878134)									
EP2110017-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	115	132	13.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	115	132	13.5	0% - 20%
EP2110017-019	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	114	118	3.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	114	118	3.1	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3878135)									
EP2110019-007	0089_MW171_210830	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	452	452	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	452	452	0.0	0% - 20%
EP2110020-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	222	222	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	222	222	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3878503)									
EP2110016-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11	11	0.0	0% - 50%
EP2110019-003	0089_QC101_210830	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1850	1820	1.4	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3878502)									
EP2110016-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	39	39	0.0	0% - 20%
EP2110019-003	0089_QC101_210830	ED045G: Chloride	16887-00-6	1	mg/L	14400	14600	1.3	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3880051)									
EP2110016-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	52	49	6.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	7	6	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	20	20	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EP2110019-005	0089_MW127_210830	ED093F: Calcium	7440-70-2	1	mg/L	408	434	6.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1190	1280	7.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	8280	8920	7.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	398	428	7.4	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3884924)									
EP2110017-009	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110017-016	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3885277)									
EP2110019-012	0089_MW202_210830	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3884924)									
EP2110017-009	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3884924) - continued									
EP2110017-016	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3885277)									
EP2110019-012	0089_MW202_210830	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3884924)									
EP2110017-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110017-016	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3884924) - continued									
EP2110017-016	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3885277)									
EP2110019-012	0089_MW202_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3884924)									
EP2110017-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110017-016	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3885277)									
EP2110019-012	0089_MW202_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3884924)									
EP2110017-009	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110017-016	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3885277)									
EP2110019-012	0089_MW202_210830	EP231X: Sum of PFAS	----	0.01	µg/L	0.08	0.08	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3878134)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	114	81.2	126
				<1	200 mg/L	99.4	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3878135)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	113	81.2	126
				<1	200 mg/L	106	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878503)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	94.2	87.7	113
				<1	500 mg/L	97.5	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3878502)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	88.8	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3880051)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	94.8	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.6	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	92.8	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	90.6	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3884924)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	88.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	93.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	83.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	95.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	92.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	104	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885277)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885277) - continued								
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	90.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	97.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	99.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	102	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3884924)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	97.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	97.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	101	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	99.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	89.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	77.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	77.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.8	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	106	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885277)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	95.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	98.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	105	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	90.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	90.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	110	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3884924)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	100	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	97.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	103	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	86.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	92.4	65.0	136

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3884924) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	86.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885277)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	111	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	94.3	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	95.4	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	91.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	93.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3884924)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	97.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	108	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	88.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	120	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885277)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	103	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	111	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	76.2	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878503)							
EP2110016-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	95.2	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3878502)							
EP2110016-007	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	96.8	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3884924)							
EP2110017-010	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	88.0	72.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3884924) - continued							
EP2110017-010	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	97.6	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	87.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	89.8	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	92.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	87.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885277)							
EP2110020-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	82.5	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	126	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	# Not Determined	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	# Not Determined	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	89.7	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	88.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3884924)							
EP2110017-010	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	97.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	103	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	96.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	107	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	102	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	98.0	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	89.0	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	85.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	82.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	78.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	106	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885277)							
EP2110020-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	85.7	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	95.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	91.4	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	95.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	# Not Determined	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	91.6	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	85.2	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	77.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	79.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	75.6	65.0	144

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885277) - continued							
EP2110020-006	Anonymous	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	97.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3884924)							
EP2110017-010	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	112	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	75.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	99.4	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	111	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	83.4	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	91.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	81.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885277)							
EP2110020-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	108	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	73.8	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	85.0	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.6	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	75.7	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	85.6	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	73.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3884924)							
EP2110017-010	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	105	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	109	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	95.8	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	74.6	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885277)							
EP2110020-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	90.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	110	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	86.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	105	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110019**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Site	: DEF19009/Stirling	Issue Date	: 10-Sep-2021
Sampler	: [redacted]	No. of samples received	: 12
Order number	: DEF19009/730	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2110020--006	Anonymous	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2110020--006	Anonymous	**Perfluoroheptane sulfonic acid (PFHpS)**	375-92-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2110020--006	Anonymous	**Perfluorooctanoic acid (PFOA)**	335-67-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	3	38	7.89	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_MW124_210830,	0089_MW125_210830,	**30-Aug-2021**	**----**	----	----	**01-Sep-2021**	13-Sep-2021	✓
0089_QC101_210830,	0089_MW126_210830,							
0089_MW127_210830,	0089_MW166_210830,							
0089_MW171_210830,	0089_MW196_210830,							
0089_QC112_210830,	0089_MW199_210830,							
0089_MW203_210830,	0089_MW202_210830							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_MW124_210830,	0089_MW125_210830,	**30-Aug-2021**	**----**	----	----	**09-Sep-2021**	27-Sep-2021	✓
0089_QC101_210830,	0089_MW126_210830,							
0089_MW127_210830,	0089_MW166_210830,							
0089_MW171_210830,	0089_MW196_210830,							
0089_QC112_210830,	0089_MW199_210830,							
0089_MW203_210830,	0089_MW202_210830							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_MW124_210830,	0089_MW125_210830,	**30-Aug-2021**	**----**	----	----	**09-Sep-2021**	27-Sep-2021	✓
0089_QC101_210830,	0089_MW126_210830,							
0089_MW127_210830,	0089_MW166_210830,							
0089_MW171_210830,	0089_MW196_210830,							
0089_QC112_210830,	0089_MW199_210830,							
0089_MW203_210830,	0089_MW202_210830							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_MW124_210830,	0089_MW125_210830,	**30-Aug-2021**	**----**	----	----	**06-Sep-2021**	06-Sep-2021	✓
0089_QC101_210830,	0089_MW126_210830,							
0089_MW127_210830,	0089_MW166_210830,							
0089_MW171_210830,	0089_MW196_210830,							
0089_QC112_210830,	0089_MW199_210830,							
0089_MW203_210830,	0089_MW202_210830							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW124_210830,	0089_MW125_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC101_210830,	0089_MW126_210830,							
0089_MW127_210830,	0089_MW166_210830,							
0089_MW171_210830,	0089_MW196_210830,							
0089_QC112_210830,	0089_MW199_210830,							
0089_MW203_210830,	0089_MW202_210830							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW124_210830,	0089_MW125_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC101_210830,	0089_MW126_210830,							
0089_MW127_210830,	0089_MW166_210830,							
0089_MW171_210830,	0089_MW196_210830,							
0089_QC112_210830,	0089_MW199_210830,							
0089_MW203_210830,	0089_MW202_210830							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0089_MW124_210830,	0089_MW125_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC101_210830,	0089_MW126_210830,							
0089_MW127_210830,	0089_MW166_210830,							
0089_MW171_210830,	0089_MW196_210830,							
0089_QC112_210830,	0089_MW199_210830,							
0089_MW203_210830,	0089_MW202_210830							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_MW124_210830,	0089_MW125_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC101_210830,	0089_MW126_210830,							
0089_MW127_210830,	0089_MW166_210830,							
0089_MW171_210830,	0089_MW196_210830,							
0089_QC112_210830,	0089_MW199_210830,							
0089_MW203_210830,	0089_MW202_210830							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0089_MW124_210830,	0089_MW125_210830,	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
0089_QC101_210830,	0089_MW126_210830,							
0089_MW127_210830,	0089_MW166_210830,							
0089_MW171_210830,	0089_MW196_210830,							
0089_QC112_210830,	0089_MW199_210830,							
0089_MW203_210830,	0089_MW202_210830							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	38	**7.89**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110019**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 26949	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 31-Aug-2021 13:00	Issue Date	: 01-Sep-2021
Client Requested Due Date	: 10-Sep-2021	Scheduled Reporting Date	: **10-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 9.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110019-001	30-Aug-2021 09:00	0089_MW124_210830	✓	✓	✓	✓
EP2110019-002	30-Aug-2021 09:22	0089_MW125_210830	✓	✓	✓	✓
EP2110019-003	30-Aug-2021 09:22	0089_QC101_210830	✓	✓	✓	✓
EP2110019-004	30-Aug-2021 09:34	0089_MW126_210830	✓	✓	✓	✓
EP2110019-005	30-Aug-2021 09:42	0089_MW127_210830	✓	✓	✓	✓
EP2110019-006	30-Aug-2021 12:39	0089_MW166_210830	✓	✓	✓	✓
EP2110019-007	30-Aug-2021 12:46	0089_MW171_210830	✓	✓	✓	✓
EP2110019-008	30-Aug-2021 14:19	0089_MW196_210830	✓	✓	✓	✓
EP2110019-009	30-Aug-2021 14:19	0089_QC112_210830	✓	✓	✓	✓
EP2110019-010	30-Aug-2021 14:37	0089_MW199_210830	✓	✓	✓	✓
EP2110019-011	30-Aug-2021 15:01	0089_MW203_210830	✓	✓	✓	✓
EP2110019-012	30-Aug-2021 15:36	0089_MW202_210830	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110019

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: Def19009_0089 **Client:** Department of defence

Project Manager [redacted]
Phone:

ALS Compass COC Reference: **# Samples:**

COC 26947; 26945; 26968; 26949; 26962; 26977; 26951; 26948;

Sampler:
Phone:

Turnaround Requirements: Standard Urgent

Special Instructions:

[redacted]

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 30/8/21	Date / Time: 31/8 1300	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: **26949** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW124		30/08/2021 09:00 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0089_MW125		30/08/2021 09:22 AM	Water	ALS: 3 Non ALS: 0	No	Partial 5/8		
003	0089_QC101		30/08/2021 09:22 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0089_MW126		30/08/2021 09:34 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0089_MW127		30/08/2021 09:42 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0089_MW166		30/08/2021 12:39 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
007	0089_MW171		30/08/2021 12:46 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
008	0089_MW196		30/08/2021 02:19 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
009	0089_QC112		30/08/2021 02:19 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

COC#: **26949** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW199		30/08/2021 02:37 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
011	0089_MW203		30/08/2021 03:01 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
012	0089_MW202	2 QCs pfas	30/08/2021 03:36 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

COC#: **26949** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW124	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW125	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_QC101	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW126	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW127	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0089_MW166	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW171	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW196	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_QC112	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **26949** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

010	0089_MW199	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_MW203	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
012	0089_MW202	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **26949** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW124	Clear Plastic Bottle - Natural	250 mL	00070520069559	Green	No	
001	0089_MW124	HDPE (no PTFE)	20 mL	00352010011167	Grey	No	
001	0089_MW124	HDPE (no PTFE)	20 mL	00352010011158	Grey	No	
002	0089_MW125	Clear Plastic Bottle - Natural	250 mL	00070520069514	Green	No	
002	0089_MW125	HDPE (no PTFE)	20 mL	00352010010881	Grey	No	
002	0089_MW125	HDPE (no PTFE)	20 mL	00352010011204	Grey	No	
003	0089_QC101	Clear Plastic Bottle - Natural	250 mL	00070520069542	Green	No	
003	0089_QC101	HDPE (no PTFE)	20 mL	00352010011215	Grey	No	
003	0089_QC101	HDPE (no PTFE)	20 mL	00352010011200	Grey	No	
004	0089_MW126	Clear Plastic Bottle - Natural	250 mL	00070520069547	Green	No	
004	0089_MW126	HDPE (no PTFE)	20 mL	00352010010942	Grey	No	
004	0089_MW126	HDPE (no PTFE)	20 mL	00352010011298	Grey	No	
005	0089_MW127	HDPE (no PTFE)	20 mL	00352010011001	Grey	No	
005	0089_MW127	HDPE (no PTFE)	20 mL	00352010011175	Grey	No	
005	0089_MW127	Clear Plastic Bottle - Natural	250 mL	00070520069550	Green	No	
006	0089_MW166	HDPE (no PTFE)	20 mL	00352010011270	Grey	No	
006	0089_MW166	HDPE (no PTFE)	20 mL	00352010011327	Grey	No	
006	0089_MW166	Clear Plastic Bottle - Natural	250 mL	00070520069506	Green	No	
007	0089_MW171	Clear Plastic Bottle - Natural	250 mL	00070520069466	Green	No	
007	0089_MW171	HDPE (no PTFE)	20 mL	00352010011226	Grey	No	
007	0089_MW171	HDPE (no PTFE)	20 mL	00352010011219	Grey	No	
008	0089_MW196	Clear Plastic Bottle - Natural	250 mL	00070520069527	Green	No	
008	0089_MW196	HDPE (no PTFE)	20 mL	00352010011268	Grey	No	
008	0089_MW196	HDPE (no PTFE)	20 mL	00352010011271	Grey	No	
009	0089_QC112	HDPE (no PTFE)	20 mL	00352010011212	Grey	No	
009	0089_QC112	Clear Plastic Bottle - Natural	250 mL	00070520069625	Green	No	

CHAIN OF CUSTODY

ALS COC#: **26949** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC - DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

009	0089_QC112	HDPE (no PTFE)	20 mL	00352010011183	Grey	No	
010	0089_MW199	Clear Plastic Bottle - Natural	250 mL	00070520069557	Green	No	
010	0089_MW199	HDPE (no PTFE)	20 mL	00352010011233	Grey	No	
010	0089_MW199	HDPE (no PTFE)	20 mL	00352010010933	Grey	No	
011	0089_MW203	Clear Plastic Bottle - Natural	250 mL	00070520069615	Green	No	
011	0089_MW203	HDPE (no PTFE)	20 mL	00352010011180	Grey	No	
011	0089_MW203	HDPE (no PTFE)	20 mL	00352010011106	Grey	No	
012	0089_MW202	Clear Plastic Bottle - Natural	250 mL	00070520069534	Green	No	
012	0089_MW202	HDPE (no PTFE)	20 mL	00352010011331	Grey	No	
012	0089_MW202	HDPE (no PTFE)	20 mL	00352010011354	Grey	No	
012	0089_MW202	HDPE (no PTFE)	20 mL	00352010011064	Grey	No	
012	0089_MW202	HDPE (no PTFE)	20 mL	00352010011246	Grey	No	

Total Bottle Count: ALS: 38, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110020**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021 13:00
Order number	: DEF19009/730	Date Analysis Commenced	: 01-Sep-2021
C-O-C number	: 26951	Issue Date	: 10-Sep-2021 14:55
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 14		
No. of samples analysed	: 14		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW121_210830	0089_MW123_210830	0089_MW109_210830	0089_MW117_210830	0089_MW112_210830
				Sampling date / time	30-Aug-2021 08:39	30-Aug-2021 09:07	30-Aug-2021 09:31	30-Aug-2021 09:46	30-Aug-2021 10:01
Compound	CAS Number	LOR	Unit		EP2110020-001	EP2110020-002	EP2110020-003	EP2110020-004	EP2110020-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		229	261	278	291	222
Total Alkalinity as CaCO3	----	1	mg/L		229	261	278	291	222
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		17	11	28	19	19
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		39	69	84	36	32
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		69	86	96	101	82
Magnesium	7439-95-4	1	mg/L		11	14	19	14	10
Sodium	7440-23-5	1	mg/L		31	40	50	27	19
Potassium	7440-09-7	1	mg/L		4	2	2	<1	1
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		6.03	7.39	8.51	7.22	5.73
ø Total Cations	----	0.01	meq/L		5.80	7.23	8.58	7.37	5.77
ø Ionic Balance	----	0.01	%		1.95	1.06	0.43	0.97	0.29
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.19	0.08	0.13	0.23	0.08
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.48	0.08	0.28	0.51	0.31
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		11.4	0.24	3.28	9.16	7.60
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		1.03	<0.02	0.18	2.00	1.14
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		76.5	0.03	1.59	40.6	31.7
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		0.1	<0.1	<0.1	<0.1	0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		0.23	0.05	0.09	0.18	0.32
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		1.22	0.25	0.46	1.25	1.07
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		0.27	<0.02	0.06	0.21	0.37

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW121_210830	0089_MW123_210830	0089_MW109_210830	0089_MW117_210830	0089_MW112_210830
				Sampling date / time	30-Aug-2021 08:39	30-Aug-2021 09:07	30-Aug-2021 09:31	30-Aug-2021 09:46	30-Aug-2021 10:01
Compound	CAS Number	LOR	Unit		EP2110020-001	EP2110020-002	EP2110020-003	EP2110020-004	EP2110020-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**1.42**	<0.01	**0.16**	**1.12**	**0.94**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.03**
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		**0.43**	<0.02	<0.02	<0.02	**0.47**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**0.05**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW121_210830	0089_MW123_210830	0089_MW109_210830	0089_MW117_210830	0089_MW112_210830
				Sampling date / time	30-Aug-2021 08:39	30-Aug-2021 09:07	30-Aug-2021 09:31	30-Aug-2021 09:46	30-Aug-2021 10:01
					EP2110020-001	EP2110020-002	EP2110020-003	EP2110020-004	EP2110020-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**93.3**	**0.73**	**6.23**	**55.3**	**44.2**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**87.9**	**0.27**	**4.87**	**49.8**	**39.3**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**91.3**	**0.65**	**5.77**	**52.8**	**42.2**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**84.8**	**102**	**93.8**	**69.0**	**85.6**
13C8-PFOA	----	0.02	%		**87.6**	**91.7**	**85.4**	**90.5**	**88.9**

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW120_210830	0089_MW161_210830	0089_MW158_210830	0089_MW-110_210830	0089_MW195D_210830
				Sampling date / time	30-Aug-2021 10:15	30-Aug-2021 10:26	30-Aug-2021 11:47	30-Aug-2021 11:49	30-Aug-2021 13:45
					EP2110020-006	EP2110020-007	EP2110020-008	EP2110020-009	EP2110020-010
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**240**	**393**	**448**	**422**	**170**
Total Alkalinity as CaCO3	----	1	mg/L		**240**	**393**	**448**	**422**	**170**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**23**	**152**	**486**	**478**	**1480**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**46**	**762**	**3720**	**3720**	**9860**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**78**	**122**	**206**	**207**	**365**
Magnesium	7439-95-4	1	mg/L		**19**	**89**	**354**	**356**	**785**
Sodium	7440-23-5	1	mg/L		**31**	**420**	**2500**	**2480**	**5770**
Potassium	7440-09-7	1	mg/L		**3**	**37**	**111**	**111**	**297**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**6.57**	**32.5**	**124**	**123**	**312**
ø Total Cations	----	0.01	meq/L		**6.88**	**32.6**	**151**	**150**	**341**
ø Ionic Balance	----	0.01	%		**2.30**	**0.18**	**9.81**	**9.87**	**4.44**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.02**	**0.04**	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.08**	**0.02**	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**16.8**	**0.50**	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**2.23**	**0.08**	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.23**	**5.09**	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.20**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.12**	**0.16**	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW120_210830	0089_MW161_210830	0089_MW158_210830	0089_MW-110_210830	0089_MW195D_210830
				Sampling date / time	30-Aug-2021 10:15	30-Aug-2021 10:26	30-Aug-2021 11:47	30-Aug-2021 11:49	30-Aug-2021 13:45
					EP2110020-006	EP2110020-007	EP2110020-008	EP2110020-009	EP2110020-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.08**	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**1.59**	**0.08**	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW120_210830	0089_MW161_210830	0089_MW158_210830	0089_MW-110_210830	0089_MW195D_210830
				Sampling date / time	30-Aug-2021 10:15	30-Aug-2021 10:26	30-Aug-2021 11:47	30-Aug-2021 11:49	30-Aug-2021 13:45
					EP2110020-006	EP2110020-007	EP2110020-008	EP2110020-009	EP2110020-010
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**21.1**	**6.25**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**17.0**	**5.59**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**18.8**	**6.15**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**95.2**	**102**	**95.4**	**99.8**	**93.3**
13C8-PFOA	----	0.02	%		**87.2**	**90.1**	**89.1**	**88.5**	**91.4**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC111_210830	0089_MW195_S_210830	0089_MW193_210830	0089_QC113_210830	----
				Sampling date / time	30-Aug-2021 13:46	30-Aug-2021 14:08	30-Aug-2021 14:33	30-Aug-2021 14:35	----
Compound	CAS Number	LOR	Unit		EP2110020-011	EP2110020-012	EP2110020-013	EP2110020-014	--------
					Result	Result	Result	Result	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		182	582	424	410	----
Total Alkalinity as CaCO3	----	1	mg/L		182	582	424	410	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1420	344	115	115	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		9580	1340	679	653	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		356	203	119	120	----
Magnesium	7439-95-4	1	mg/L		764	167	73	72	----
Sodium	7440-23-5	1	mg/L		5610	765	353	345	----
Potassium	7440-09-7	1	mg/L		292	56	27	27	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		303	56.6	30.0	29.0	----
ø Total Cations	----	0.01	meq/L		332	58.6	28.0	27.6	----
ø Ionic Balance	----	0.01	%		4.51	1.73	3.50	2.46	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	1.08	1.07	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	1.31	1.21	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	8.93	8.17	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	0.78	0.80	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	4.45	3.75	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	0.3	0.2	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	0.43	0.42	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	2.38	2.36	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC111_210830	0089_MW195_S_210830	0089_MW193_210830	0089_QC113_210830	----
				Sampling date / time	30-Aug-2021 13:46	30-Aug-2021 14:08	30-Aug-2021 14:33	30-Aug-2021 14:35	----
Compound	CAS Number	LOR	Unit		EP2110020-011	EP2110020-012	EP2110020-013	EP2110020-014	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**0.22**	**0.22**	**----**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.60**	**0.60**	**----**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**----**
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**----**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**----**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**----**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**----**
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**----**
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**----**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**----**
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**----**
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**----**
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**----**
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**----**
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**----**
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**----**
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	**0.06**	**----**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**----**

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC111_210830	0089_MW195_S_210830	0089_MW193_210830	0089_QC113_210830	----
				Sampling date / time	30-Aug-2021 13:46	30-Aug-2021 14:08	30-Aug-2021 14:33	30-Aug-2021 14:35	----
					EP2110020-011	EP2110020-012	EP2110020-013	EP2110020-014	--------
					Result	Result	Result	Result	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**----**
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**20.5**	**18.9**	**----**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**13.4**	**11.9**	**----**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**18.4**	**16.8**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**91.9**	**95.4**	**95.2**	**91.4**	**----**
13C8-PFOA	----	0.02	%		**88.2**	**98.2**	**99.7**	**92.4**	**----**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110020**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 01-Sep-2021
C-O-C number	: 26951	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 14		
No. of samples analysed	: 14		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3878135)									
EP2110019-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	452	452	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	452	452	0.0	0% - 20%
EP2110020-005	0089_MW112_210830	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	222	222	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	222	222	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3878509)									
EP2110020-001	0089_MW121_210830	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	17	17	0.0	0% - 50%
EP2110020-011	0089_QC111_210830	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1420	1390	2.3	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3878508)									
EP2110020-001	0089_MW121_210830	ED045G: Chloride	16887-00-6	1	mg/L	39	39	0.0	0% - 20%
EP2110020-011	0089_QC111_210830	ED045G: Chloride	16887-00-6	1	mg/L	9580	9540	0.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3880051)									
EP2110019-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	408	434	6.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1190	1280	7.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	8280	8920	7.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	398	428	7.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3880052)									
EP2110020-003	0089_MW109_210830	ED093F: Calcium	7440-70-2	1	mg/L	96	92	3.3	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	19	18	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	50	46	9.9	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3880052) - continued									
EP2110020-003	0089_MW109_210830	ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.0	No Limit
EP2110020-013	0089_MW193_210830	ED093F: Calcium	7440-70-2	1	mg/L	119	122	2.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	73	74	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	353	356	0.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	27	28	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3885277)									
EP2110019-012	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3886270)									
EP2110020-012	0089_MW195_S_210830	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110099-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3885277)									
EP2110019-012	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3886270)									
EP2110020-012	0089_MW195_S_210830	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3886270) - continued									
EP2110020-012	0089_MW195_S_210830	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110099-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3885277)									
EP2110019-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3886270)									
EP2110020-012	0089_MW195_S_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3886270) - continued									
EP2110020-012	0089_MW195_S_210830	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110099-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3885277)									
EP2110019-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3886270)									
EP2110020-012	0089_MW195_S_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3886270) - continued									
EP2110099-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3885277)									
EP2110019-012	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.08	0.08	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3886270)									
EP2110020-012	0089_MW195_S_210830	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110099-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3878135)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	113	81.2	126
				<1	200 mg/L	106	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878509)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	98.4	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3878508)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	91.4	87.9	114
				<1	1000 mg/L	100	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3880051)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	94.8	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.6	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	92.8	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	90.6	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3880052)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.8	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.3	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.6	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885277)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	90.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	97.8	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	99.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	102	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3886270)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	75.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	87.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	78.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	92.4	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3886270) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	80.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	89.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885277)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	95.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	98.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	109	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	105	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	90.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	90.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	110	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3886270)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	87.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	90.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	82.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	92.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	91.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	84.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	73.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	77.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	73.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	98.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885277)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	111	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	94.3	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	110	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	95.4	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	91.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	93.0	61.0	135

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3886270)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	95.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	76.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	85.3	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	103	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	78.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	88.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	73.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885277)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	103	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	111	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	76.2	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3886270)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	93.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	91.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	83.4	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878509)							
EP2110020-001	0089_MW121_210830	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	101	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3878508)							
EP2110020-001	0089_MW121_210830	ED045G: Chloride	16887-00-6	1000 mg/L	95.6	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885277)							
EP2110020-006	0089_MW120_210830	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	82.5	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	126	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	# Not Determined	68.0	131

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885277) - continued							
EP2110020-006	0089_MW120_210830	EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	# Not Determined	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	89.7	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	88.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3886270)							
EP2110021-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	82.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	99.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	94.2	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	92.8	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	92.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	104	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885277)							
EP2110020-006	0089_MW120_210830	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	85.7	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	95.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	91.4	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	95.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	# Not Determined	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	91.6	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	85.2	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	77.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	79.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	75.6	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	97.9	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3886270)							
EP2110021-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	90.1	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	94.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	86.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	98.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	92.8	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	92.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	86.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	76.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	75.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	74.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	99.1	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885277)							
EP2110020-006	0089_MW120_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	108	67.0	137

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885277) - continued							
EP2110020-006	0089_MW120_210830	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	73.8	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	85.0	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.6	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	75.7	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	85.6	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	73.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3886270)							
EP2110021-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	89.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	79.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	80.4	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	113	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	83.5	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	83.8	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	71.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885277)							
EP2110020-006	0089_MW120_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	90.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	110	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	86.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	105	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3886270)							
EP2110021-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	82.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	83.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	122	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	97.4	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110020**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Site	: DEF19009/Stirling	Issue Date	: 10-Sep-2021
Sampler	: [redacted]	No. of samples received	: 14
Order number	: DEF19009/730	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2110020--006	0089_MW120_210830	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2110020--006	0089_MW120_210830	**Perfluoroheptane sulfonic acid (PFHpS)**	375-92-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2110020--006	0089_MW120_210830	**Perfluorooctanoic acid (PFOA)**	335-67-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	3	38	7.89	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_MW121_210830,	0089_MW123_210830,	**30-Aug-2021**	**----**	----	----	**01-Sep-2021**	13-Sep-2021	✓
0089_MW109_210830,	0089_MW117_210830,							
0089_MW112_210830,	0089_MW120_210830,							
0089_MW161_210830,	0089_MW158_210830,							
0089_MW-110_210830,	0089_MW195D_210830,							
0089_QC111_210830,	0089_MW195_S_210830,							
0089_MW193_210830,	0089_QC113_210830							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW121_210830, 0089_MW123_210830, 0089_MW109_210830, 0089_MW117_210830, 0089_MW112_210830, 0089_MW120_210830, 0089_MW161_210830, 0089_MW158_210830, 0089_MW-110_210830, 0089_MW195D_210830, 0089_QC111_210830, 0089_MW195_S_210830, 0089_MW193_210830, 0089_QC113_210830	**30-Aug-2021**	**----**	----	----	**09-Sep-2021**	27-Sep-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW121_210830, 0089_MW123_210830, 0089_MW109_210830, 0089_MW117_210830, 0089_MW112_210830, 0089_MW120_210830, 0089_MW161_210830, 0089_MW158_210830, 0089_MW-110_210830, 0089_MW195D_210830, 0089_QC111_210830, 0089_MW195_S_210830, 0089_MW193_210830, 0089_QC113_210830	**30-Aug-2021**	**----**	----	----	**09-Sep-2021**	27-Sep-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW121_210830, 0089_MW123_210830, 0089_MW109_210830, 0089_MW117_210830, 0089_MW112_210830, 0089_MW120_210830, 0089_MW161_210830, 0089_MW158_210830, 0089_MW-110_210830, 0089_MW195D_210830, 0089_QC111_210830, 0089_MW195_S_210830, 0089_MW193_210830, 0089_QC113_210830	**30-Aug-2021**	**----**	----	----	**06-Sep-2021**	06-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW121_210830, 0089_MW123_210830, 0089_MW109_210830, 0089_MW117_210830, 0089_MW112_210830, 0089_MW120_210830, 0089_MW161_210830, 0089_MW158_210830, 0089_MW-110_210830, 0089_MW195D_210830, 0089_QC111_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
HDPE (no PTFE) (EP231X)							
0089_MW195_S_210830, 0089_MW193_210830, 0089_QC113_210830	**30-Aug-2021**	**07-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) 0089_MW121_210830, 0089_MW123_210830, 0089_MW109_210830, 0089_MW117_210830, 0089_MW112_210830, 0089_MW120_210830, 0089_MW161_210830, 0089_MW158_210830, 0089_MW-110_210830, 0089_MW195D_210830, 0089_QC111_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
HDPE (no PTFE) (EP231X) 0089_MW195_S_210830, 0089_MW193_210830, 0089_QC113_210830	**30-Aug-2021**	**07-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) 0089_MW121_210830, 0089_MW123_210830, 0089_MW109_210830, 0089_MW117_210830, 0089_MW112_210830, 0089_MW120_210830, 0089_MW161_210830, 0089_MW158_210830, 0089_MW-110_210830, 0089_MW195D_210830, 0089_QC111_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
HDPE (no PTFE) (EP231X) 0089_MW195_S_210830, 0089_MW193_210830, 0089_QC113_210830	**30-Aug-2021**	**07-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0089_MW121_210830, 0089_MW123_210830, 0089_MW109_210830, 0089_MW117_210830, 0089_MW112_210830, 0089_MW120_210830, 0089_MW161_210830, 0089_MW158_210830, 0089_MW-110_210830, 0089_MW195D_210830, 0089_QC111_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
HDPE (no PTFE) (EP231X) 0089_MW195_S_210830, 0089_MW193_210830, 0089_QC113_210830	**30-Aug-2021**	**07-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) 0089_MW121_210830, 0089_MW123_210830, 0089_MW109_210830, 0089_MW117_210830, 0089_MW112_210830, 0089_MW120_210830, 0089_MW161_210830, 0089_MW158_210830, 0089_MW-110_210830, 0089_MW195D_210830, 0089_QC111_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
HDPE (no PTFE) (EP231X) 0089_MW195_S_210830, 0089_MW193_210830, 0089_QC113_210830	**30-Aug-2021**	**07-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	30	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	38	**7.89**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110020**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 26951	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 31-Aug-2021 13:00	Issue Date	: 01-Sep-2021
Client Requested Due Date	: 10-Sep-2021	Scheduled Reporting Date	: **10-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 9.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 14 / 14

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110020-001	30-Aug-2021 08:39	0089_MW121_210830	✓	✓	✓	✓
EP2110020-002	30-Aug-2021 09:07	0089_MW123_210830	✓	✓	✓	✓
EP2110020-003	30-Aug-2021 09:31	0089_MW109_210830	✓	✓	✓	✓
EP2110020-004	30-Aug-2021 09:46	0089_MW117_210830	✓	✓	✓	✓
EP2110020-005	30-Aug-2021 10:01	0089_MW112_210830	✓	✓	✓	✓
EP2110020-006	30-Aug-2021 10:15	0089_MW120_210830	✓	✓	✓	✓
EP2110020-007	30-Aug-2021 10:26	0089_MW161_210830	✓	✓	✓	✓
EP2110020-008	30-Aug-2021 11:47	0089_MW158_210830	✓	✓	✓	✓
EP2110020-009	30-Aug-2021 11:49	0089_MW-110_210830	✓	✓	✓	✓
EP2110020-010	30-Aug-2021 13:45	0089_MW195D_210830	✓	✓	✓	✓
EP2110020-011	30-Aug-2021 13:46	0089_QC111_210830	✓	✓	✓	✓
EP2110020-012	30-Aug-2021 14:08	0089_MW195_S_210830	✓	✓	✓	✓
EP2110020-013	30-Aug-2021 14:33	0089_MW193_210830	✓	✓	✓	✓
EP2110020-014	30-Aug-2021 14:35	0089_QC113_210830	✓	✓		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2110020

Telephone : - 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: Def19009_0034 **Client:** Department of defence. **Project Manager** [redacted]
Phone:

ALS Compass COC Reference: **# Samples:** **Sampler:**
COC 26967; 26965; 26968; 26969; 26962; 26977; 26951; 26948; **Phone:**

Turnaround Requirements: Standard Urgent

Special Instructions:

[redacted]

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 30/8/21	Date / Time: 31/8 1300	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: **26951** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW121		30/08/2021 08:39 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0089_MW123		30/08/2021 09:07 AM	Water	ALS: 3 Non ALS: 0	No	Partial 5/8		
003	0089_MW109		30/08/2021 09:31 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0089_MW117		30/08/2021 09:46 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0089_MW112		30/08/2021 10:01 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0089_MW120	2 extra PFAS bottles collected for lab internal QC	30/08/2021 10:15 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		
007	0089_MW161		30/08/2021 10:26 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
008	0089_MW158		30/08/2021 11:47 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
009	0089_MW-110		30/08/2021 11:49 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: **26951** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW195D		30/08/2021 01:45 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
011	0089_QC111		30/08/2021 01:46 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
012	0089_MW195_S	Two extra pfas bottles for internal lab Qa/Qc	30/08/2021 02:08 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		
013	0089_MW193		30/08/2021 02:33 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
014	0089_QC113		30/08/2021 02:35 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

COC#: **26951** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW121	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW123	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW109	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW117	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW112	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0089_MW120	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW161	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW158	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_MW-110	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: **26951** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

010	0089_MW195D	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_QC111	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
012	0089_MW195_S	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
013	0089_MW193	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
014	0089_QC113	Ground Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **26951** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW121	HDPE (no PTFE)	20 mL	00352010011239	Grey	No	
001	0089_MW121	HDPE (no PTFE)	20 mL	00352010011353	Grey	No	
001	0089_MW121	Clear Plastic Bottle - Natural	250 mL	00070520069470	Green	No	
002	0089_MW123	Clear Plastic Bottle - Natural	250 mL	00070520069460	Green	No	
002	0089_MW123	HDPE (no PTFE)	20 mL	00352010011241	Grey	No	
002	0089_MW123	HDPE (no PTFE)	20 mL	00352010011345	Grey	No	
003	0089_MW109	Clear Plastic Bottle - Natural	250 mL	00070520069498	Green	No	
003	0089_MW109	HDPE (no PTFE)	20 mL	00352010011206	Grey	No	
003	0089_MW109	HDPE (no PTFE)	20 mL	00352010011255	Grey	No	
004	0089_MW117	Clear Plastic Bottle - Natural	250 mL	00070520069497	Green	No	
004	0089_MW117	HDPE (no PTFE)	20 mL	00352010011306	Grey	No	
004	0089_MW117	HDPE (no PTFE)	20 mL	00352010011295	Grey	No	
005	0089_MW112	Clear Plastic Bottle - Natural	250 mL	00070520069492	Green	No	
005	0089_MW112	HDPE (no PTFE)	20 mL	00352010011218	Grey	No	
005	0089_MW112	HDPE (no PTFE)	20 mL	00352010011291	Grey	No	
006	0089_MW120	Clear Plastic Bottle - Natural	250 mL	00070520069489	Green	No	
006	0089_MW120	HDPE (no PTFE)	20 mL	00352010011326	Grey	No	
006	0089_MW120	HDPE (no PTFE)	20 mL	00352010011303	Grey	No	
006	0089_MW120	HDPE (no PTFE)	20 mL	00352010011274	Grey	No	
006	0089_MW120	HDPE (no PTFE)	20 mL	00352010011269	Grey	No	
007	0089_MW161	Clear Plastic Bottle - Natural	250 mL	00070520069481	Green	No	
007	0089_MW161	HDPE (no PTFE)	20 mL	00352010011244	Grey	No	
007	0089_MW161	HDPE (no PTFE)	20 mL	00352010011260	Grey	No	
008	0089_MW158	Clear Plastic Bottle - Natural	250 mL	00070520069467	Green	No	
008	0089_MW158	HDPE (no PTFE)	20 mL	00352010011232	Grey	No	
008	0089_MW158	HDPE (no PTFE)	20 mL	00352010011320	Grey	No	

CHAIN OF CUSTODY

ALS COC#: **26951** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

009	0089_MW-110	HDPE (no PTFE)	20 mL	00352010011262	Grey	No	
009	0089_MW-110	HDPE (no PTFE)	20 mL	00352010011256	Grey	No	
009	0089_MW-110	Clear Plastic Bottle - Natural	250 mL	00070520069473	Green	No	
010	0089_MW195D	HDPE (no PTFE)	20 mL	00352010011296	Grey	No	
010	0089_MW195D	HDPE (no PTFE)	20 mL	00352010011281	Grey	No	
010	0089_MW195D	Clear Plastic Bottle - Natural	250 mL	00070520069505	Green	No	
011	0089_QC111	HDPE (no PTFE)	20 mL	00352010011278	Grey	No	
011	0089_QC111	HDPE (no PTFE)	20 mL	00352010011322	Grey	No	
011	0089_QC111	Clear Plastic Bottle - Natural	250 mL	00070520069475	Green	No	
012	0089_MW195_S	HDPE (no PTFE)	20 mL	00352010011292	Grey	No	
012	0089_MW195_S	Clear Plastic Bottle - Natural	250 mL	00070520069517	Green	No	
012	0089_MW195_S	HDPE (no PTFE)	20 mL	00352010011352	Grey	No	
012	0089_MW195_S	HDPE (no PTFE)	20 mL	00352010011307	Grey	No	
012	0089_MW195_S	HDPE (no PTFE)	20 mL	00352101017200	Grey	No	
013	0089_MW193	HDPE (no PTFE)	20 mL	00352010011238	Grey	No	
013	0089_MW193	Clear Plastic Bottle - Natural	250 mL	00070520069503	Green	No	
013	0089_MW193	HDPE (no PTFE)	20 mL	00352010011359	Grey	No	
014	0089_QC113	Clear Plastic Bottle - Natural	250 mL	00070520069500	Green	No	
014	0089_QC113	HDPE (no PTFE)	20 mL	00352010011364	Grey	No	
014	0089_QC113	HDPE (no PTFE)	20 mL	00352010011302	Grey	No	

Total Bottle Count: ALS: 46, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110021**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021 13:00
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 26962	Issue Date	: 10-Sep-2021 09:37
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW363_210830	0089_QC106_210830	0089_PW362_210830	0089_PW364_210830	0089_PW341_210830
				Sampling date / time	30-Aug-2021 10:33	30-Aug-2021 10:34	30-Aug-2021 10:35	30-Aug-2021 10:37	30-Aug-2021 10:37
Compound	CAS Number	LOR	Unit		EP2110021-005	EP2110021-006	EP2110021-007	EP2110021-008	EP2110021-009
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		127	117	116	118	126
Total Alkalinity as CaCO3	----	1	mg/L		127	117	116	118	126
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2470	2420	2420	2360	2340
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17300	17500	17100	17400	17100
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		415	414	425	408	406
Magnesium	7439-95-4	1	mg/L		1280	1290	1320	1270	1240
Sodium	7440-23-5	1	mg/L		9870	10000	10100	9820	9580
Potassium	7440-09-7	1	mg/L		573	577	586	567	556
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		542	546	535	542	534
ø Total Cations	----	0.01	meq/L		570	576	584	566	553
ø Ionic Balance	----	0.01	%		2.52	2.69	4.38	2.18	1.81
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW363_210830	0089_QC106_210830	0089_PW362_210830	0089_PW364_210830	0089_PW341_210830
				Sampling date / time	30-Aug-2021 10:33	30-Aug-2021 10:34	30-Aug-2021 10:35	30-Aug-2021 10:37	30-Aug-2021 10:37
Compound	CAS Number	LOR	Unit		EP2110021-005	EP2110021-006	EP2110021-007	EP2110021-008	EP2110021-009
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW363_210830	0089_QC106_210830	0089_PW362_210830	0089_PW364_210830	0089_PW341_210830
				Sampling date / time	30-Aug-2021 10:33	30-Aug-2021 10:34	30-Aug-2021 10:35	30-Aug-2021 10:37	30-Aug-2021 10:37
					EP2110021-005	EP2110021-006	EP2110021-007	EP2110021-008	EP2110021-009
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**91.7**	**88.3**	**99.3**	**99.3**	**98.1**
13C8-PFOA	----	0.02	%		**94.7**	**93.7**	**97.6**	**92.0**	**96.4**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW340_210830	0089_PW335_210830	0089_PW356_210830	----	----
				Sampling date / time	30-Aug-2021 10:38	30-Aug-2021 10:39	30-Aug-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EP2110021-010	EP2110021-011	EP2110021-012	--------	--------
					Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		124	114	201	----	----
Total Alkalinity as CaCO3	----	1	mg/L		124	114	201	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2450	2400	2540	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		16800	17700	17800	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		406	409	443	----	----
Magnesium	7439-95-4	1	mg/L		1250	1260	1310	----	----
Sodium	7440-23-5	1	mg/L		9650	9740	10100	----	----
Potassium	7440-09-7	1	mg/L		558	564	582	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		527	552	559	----	----
ø Total Cations	----	0.01	meq/L		557	562	584	----	----
ø Ionic Balance	----	0.01	%		2.74	0.96	2.20	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW340_210830	0089_PW335_210830	0089_PW356_210830	----	----
				Sampling date / time	30-Aug-2021 10:38	30-Aug-2021 10:39	30-Aug-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EP2110021-010	EP2110021-011	EP2110021-012	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW340_210830	0089_PW335_210830	0089_PW356_210830	----	----
				Sampling date / time	30-Aug-2021 10:38	30-Aug-2021 10:39	30-Aug-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EP2110021-010	EP2110021-011	EP2110021-012	--------	--------
					Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**95.0**	**95.5**	**95.2**	----	----
13C8-PFOA	----	0.02	%		**95.6**	**97.0**	**95.9**	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW134_210830	0089_QC104_210830	0089_SW132_210830	0089_SW130_210830	----
				Sampling date / time	30-Aug-2021 09:48	30-Aug-2021 09:49	30-Aug-2021 10:01	30-Aug-2021 10:03	----
Compound	CAS Number	LOR	Unit		EP2110021-001	EP2110021-002	EP2110021-003	EP2110021-004	--------
					Result	Result	Result	Result	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		117	120	120	119	----
Total Alkalinity as CaCO3	----	1	mg/L		117	120	120	119	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2560	2500	2470	2770	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17800	17600	17500	17700	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		435	430	420	424	----
Magnesium	7439-95-4	1	mg/L		1350	1330	1300	1310	----
Sodium	7440-23-5	1	mg/L		10400	10300	10000	10100	----
Potassium	7440-09-7	1	mg/L		600	595	578	584	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		558	551	547	559	----
ø Total Cations	----	0.01	meq/L		600	594	578	583	----
ø Ionic Balance	----	0.01	%		3.69	3.78	2.69	2.09	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW134_210830	0089_QC104_210830	0089_SW132_210830	0089_SW130_210830	----
				Sampling date / time	30-Aug-2021 09:48	30-Aug-2021 09:49	30-Aug-2021 10:01	30-Aug-2021 10:03	----
Compound	CAS Number	LOR	Unit		EP2110021-001	EP2110021-002	EP2110021-003	EP2110021-004	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW134_210830	0089_QC104_210830	0089_SW132_210830	0089_SW130_210830	----
				Sampling date / time	30-Aug-2021 09:48	30-Aug-2021 09:49	30-Aug-2021 10:01	30-Aug-2021 10:03	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2110021-001**	**EP2110021-002**	**EP2110021-003**	**EP2110021-004**	**--------**
					Result	Result	Result	Result	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**----**
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**----**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**----**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**98.2**	**87.0**	**101**	**89.9**	**----**
13C8-PFOA	----	0.02	%		**100**	**92.6**	**95.3**	**96.3**	**----**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110021**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 26962	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3880384)									
EP2110021-002	0089_QC104_210830	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	120	118	1.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	120	118	1.6	0% - 20%
EP2110021-012	0089_PW356_210830	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	201	206	2.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	201	206	2.3	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3878509)									
EP2110020-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	17	17	0.0	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3881206)									
EP2110021-007	0089_PW362_210830	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2420	2450	1.4	0% - 20%
EP2110072-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2520	2500	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3878508)									
EP2110020-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	39	39	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3881205)									
EP2110021-007	0089_PW362_210830	ED045G: Chloride	16887-00-6	1	mg/L	17100	17300	1.1	0% - 20%
EP2110072-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18000	18000	0.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3880056)									
EP2110017-021	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	424	436	2.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1320	1350	2.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10200	10400	2.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	586	602	2.6	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 3880056) - continued									
EP2110021-009	0089_PW341_210830	ED093F: Calcium	7440-70-2	1	mg/L	406	405	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1240	1240	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9580	9630	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	556	557	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3886270)									
EP2110020-012	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110099-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3886270)									
EP2110020-012	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110099-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3886270)									
EP2110020-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110099-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3886270)									
EP2110020-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110099-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3886270) - continued									
EP2110099-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3886270)									
EP2110020-012	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110099-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3880384)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	100	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878509)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	98.4	87.7	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881206)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	108	87.7	113
				<1	500 mg/L	105	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3878508)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	91.4	87.9	114
				<1	1000 mg/L	100	87.9	114
ED045G: Chloride by Discrete Analyser (QCLot: 3881205)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.3	87.9	114
				<1	1000 mg/L	104	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3880056)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.6	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.9	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	107	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3886270)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	75.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	87.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	78.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	92.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	80.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	89.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3886270)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	87.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	90.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	82.4	72.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3886270) - continued								
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	92.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	91.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	84.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	73.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	77.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	73.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	98.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3886270)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	95.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	76.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	85.3	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	103	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	78.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	88.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	73.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3886270)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	93.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	91.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.4	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	83.4	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3878509)							
EP2110020-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	101	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881206)							
EP2110021-007	0089_PW362_210830	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 3878508)							
EP2110020-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	95.6	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3881205)							
EP2110021-007	0089_PW362_210830	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3886270)							
EP2110021-006	0089_QC106_210830	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	82.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	99.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	94.2	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	92.8	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	92.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	104	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3886270)							
EP2110021-006	0089_QC106_210830	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	90.1	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	94.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	86.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	98.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	92.8	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	92.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	86.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	76.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	75.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	74.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	99.1	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3886270)							
EP2110021-006	0089_QC106_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	89.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	79.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	80.4	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	113	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	83.5	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	83.8	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	71.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3886270)							
EP2110021-006	0089_QC106_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	82.4	63.0	143

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3886270) - continued							
EP2110021-006	0089_QC106_210830	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	83.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	122	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	97.4	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110021**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Site	: DEF19009/Stirling	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 12
Order number	: DEF19009/730	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2110021--007	0089_PW362_210830	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2110021--007	0089_PW362_210830	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Chloride by Discrete Analyser	3	38	7.89	10.00	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	3	37	8.11	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_SW134_210830, 0089_QC104_210830, 0089_SW132_210830, 0089_SW130_210830, 0089_PW363_210830, 0089_QC106_210830, 0089_PW362_210830, 0089_PW364_210830, 0089_PW341_210830, 0089_PW340_210830, 0089_PW335_210830, 0089_PW356_210830	**30-Aug-2021**	**----**	----	----	**02-Sep-2021**	13-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_PW362_210830, 0089_PW364_210830, 0089_PW341_210830, 0089_PW340_210830, 0089_PW335_210830, 0089_PW356_210830	**30-Aug-2021**	**----**	----	----	**08-Sep-2021**	27-Sep-2021	✓
Clear Plastic Bottle - Natural (ED041G)							
0089_SW134_210830, 0089_QC104_210830, 0089_SW132_210830, 0089_SW130_210830, 0089_PW363_210830, 0089_QC106_210830	**30-Aug-2021**	**----**	----	----	**09-Sep-2021**	27-Sep-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW362_210830, 0089_PW364_210830, 0089_PW341_210830, 0089_PW340_210830, 0089_PW335_210830, 0089_PW356_210830	**30-Aug-2021**	**----**	----	----	**08-Sep-2021**	27-Sep-2021	✓
Clear Plastic Bottle - Natural (ED045G)							
0089_SW134_210830, 0089_QC104_210830, 0089_SW132_210830, 0089_SW130_210830, 0089_PW363_210830, 0089_QC106_210830	**30-Aug-2021**	**----**	----	----	**09-Sep-2021**	27-Sep-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_SW134_210830, 0089_QC104_210830, 0089_SW132_210830, 0089_SW130_210830, 0089_PW363_210830, 0089_QC106_210830, 0089_PW362_210830, 0089_PW364_210830, 0089_PW341_210830, 0089_PW340_210830, 0089_PW335_210830, 0089_PW356_210830	**30-Aug-2021**	**----**	----	----	**06-Sep-2021**	06-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW134_210830, 0089_QC104_210830, 0089_SW132_210830, 0089_SW130_210830, 0089_PW363_210830, 0089_QC106_210830, 0089_PW362_210830, 0089_PW364_210830, 0089_PW341_210830, 0089_PW340_210830, 0089_PW335_210830, 0089_PW356_210830	**30-Aug-2021**	**07-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW134_210830, 0089_QC104_210830, 0089_SW132_210830, 0089_SW130_210830, 0089_PW363_210830, 0089_QC106_210830, 0089_PW362_210830, 0089_PW364_210830, 0089_PW341_210830, 0089_PW340_210830, 0089_PW335_210830, 0089_PW356_210830	**30-Aug-2021**	**07-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_SW134_210830, 0089_QC104_210830, 0089_SW132_210830, 0089_SW130_210830, 0089_PW363_210830, 0089_QC106_210830, 0089_PW362_210830, 0089_PW364_210830, 0089_PW341_210830, 0089_PW340_210830, 0089_PW335_210830, 0089_PW356_210830	**30-Aug-2021**	**07-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_SW134_210830, 0089_QC104_210830, 0089_SW132_210830, 0089_SW130_210830, 0089_PW363_210830, 0089_QC106_210830, 0089_PW362_210830, 0089_PW364_210830, 0089_PW341_210830, 0089_PW340_210830, 0089_PW335_210830, 0089_PW356_210830	**30-Aug-2021**	**07-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW134_210830, 0089_QC104_210830, 0089_SW132_210830, 0089_SW130_210830, 0089_PW363_210830, 0089_QC106_210830, 0089_PW362_210830, 0089_PW364_210830, 0089_PW341_210830, 0089_PW340_210830, 0089_PW335_210830, 0089_PW356_210830	**30-Aug-2021**	**07-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	26-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	38	**7.89**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	37	**8.11**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110021**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 26962	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 31-Aug-2021 13:00	Issue Date	: 01-Sep-2021
Client Requested Due Date	: 10-Sep-2021	Scheduled Reporting Date	: **10-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 9.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110021-001	30-Aug-2021 09:48	0089_SW134_210830	✓	✓	✓	✓
EP2110021-002	30-Aug-2021 09:49	0089_QC104_210830	✓	✓	✓	✓
EP2110021-003	30-Aug-2021 10:01	0089_SW132_210830	✓	✓	✓	✓
EP2110021-004	30-Aug-2021 10:03	0089_SW130_210830	✓	✓	✓	✓
EP2110021-005	30-Aug-2021 10:33	0089_PW363_210830	✓	✓	✓	✓
EP2110021-006	30-Aug-2021 10:34	0089_QC106_210830	✓	✓	✓	✓
EP2110021-007	30-Aug-2021 10:35	0089_PW362_210830	✓	✓	✓	✓
EP2110021-008	30-Aug-2021 10:37	0089_PW364_210830	✓	✓	✓	✓
EP2110021-009	30-Aug-2021 10:37	0089_PW341_210830	✓	✓	✓	✓
EP2110021-010	30-Aug-2021 10:38	0089_PW340_210830	✓	✓	✓	✓
EP2110021-011	30-Aug-2021 10:39	0089_PW335_210830	✓	✓	✓	✓
EP2110021-012	30-Aug-2021 00:00	0089_PW356_210830	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2110021

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: Def19009_0059 **Client:** Department of defence **Project Manager:** [redacted]
Phone:

ALS Compass COC Reference: **# Samples:** **Sampler:** [redacted]
Phone:

COC 26947; 26945; 26968; 26949; 26962; 26977; 26951; 26948;

Turnaround Requirements: Standard Urgent

Special Instructions:

[redacted]

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 30/8/21	**Date / Time:** 31/8 1300	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

COC#: **26962** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW134		30/08/2021 09:48 AM	Water	ALS: 3 Non ALS: 0	No	Partial 7/8		
002	0089_QC104		30/08/2021 09:49 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0089_SW132		30/08/2021 10:01 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0089_SW130	2 x pfas lab qc bottles	30/08/2021 10:03 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		
005	0089_PW363		30/08/2021 10:33 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0089_QC106	2 x pfas lab QC bottles	30/08/2021 10:34 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		
007	0089_PW362	2x pfas lab QC	30/08/2021 10:35 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		
008	0089_PW364		30/08/2021 10:37 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
009	0089_PW341		30/08/2021 10:37 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: **26962** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_PW340		30/08/2021 10:38 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
011	0089_PW335		30/08/2021 10:39 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

PW356

CHAIN OF CUSTODY

ALS COC#: **26962** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW134	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_QC104	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_SW132	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW130	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_PW363	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0089_QC106	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW362	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_PW364	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_PW341	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **26962** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

010	0089_PW340	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_PW335	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: **26962** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW134	Clear Plastic Bottle - Natural	250 mL	00070520069538	Green	No	
001	0089_SW134	HDPE (no PTFE)	20 mL	00352010011093	Grey	No	
001	0089_SW134	HDPE (no PTFE)	20 mL	00352010010888	Grey	No	
002	0089_QC104	Clear Plastic Bottle - Natural	250 mL	00070520069532	Green	No	
002	0089_QC104	HDPE (no PTFE)	20 mL	00352010011365	Grey	No	
002	0089_QC104	HDPE (no PTFE)	20 mL	00352010011087	Grey	No	
003	0089_SW132	HDPE (no PTFE)	20 mL	00352010010993	Grey	No	
003	0089_SW132	Clear Plastic Bottle - Natural	250 mL	00070520069581	Green	No	
003	0089_SW132	HDPE (no PTFE)	20 mL	00352010011282	Grey	No	
004	0089_SW130	Clear Plastic Bottle - Natural	250 mL	00070520069545	Green	No	
004	0089_SW130	HDPE (no PTFE)	20 mL	00352010011247	Grey	No	
004	0089_SW130	HDPE (no PTFE)	20 mL	00352010011160	Grey	No	
004	0089_SW130	HDPE (no PTFE)	20 mL	00350019130913	Grey	No	
004	0089_SW130	HDPE (no PTFE)	20 mL	00350019130737	Grey	No	
005	0089_PW363	Clear Plastic Bottle - Natural	250 mL	00070520069523	Green	No	
005	0089_PW363	HDPE (no PTFE)	20 mL	00352010011170	Grey	No	
005	0089_PW363	HDPE (no PTFE)	20 mL	00352010011073	Grey	No	
006	0089_QC106	Clear Plastic Bottle - Natural	250 mL	00070520069521	Green	No	
006	0089_QC106	HDPE (no PTFE)	20 mL	00352010011280	Grey	No	
006	0089_QC106	HDPE (no PTFE)	20 mL	00352010011300	Grey	No	
006	0089_QC106	HDPE (no PTFE)	20 mL	00350019163948	Grey	No	
006	0089_QC106	HDPE (no PTFE)	20 mL	00350019164111	Grey	No	
007	0089_PW362	Clear Plastic Bottle - Natural	250 mL	00070520069567	Green	No	
007	0089_PW362	HDPE (no PTFE)	20 mL	00352010011231	Grey	No	
007	0089_PW362	HDPE (no PTFE)	20 mL	00352010011163	Grey	No	
007	0089_PW362	HDPE (no PTFE)	20 mL	00350019126750	Grey	No	

CHAIN OF CUSTODY

COC#: **26962** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

007	0089_PW362	HDPE (no PTFE)	20 mL	00350019102620	Grey	No	
008	0089_PW364	HDPE (no PTFE)	20 mL	00352010011341	Grey	No	
008	0089_PW364	HDPE (no PTFE)	20 mL	00352010011052	Grey	No	
008	0089_PW364	Clear Plastic Bottle - Natural	250 mL	00070520069544	Green	No	
009	0089_PW341	HDPE (no PTFE)	20 mL	00352010011168	Grey	No	
009	0089_PW341	HDPE (no PTFE)	20 mL	00352010011220	Grey	No	
009	0089_PW341	Clear Plastic Bottle - Natural	250 mL	00070520069539	Green	No	
010	0089_PW340	Clear Plastic Bottle - Natural	250 mL	00070520069611	Green	No	
010	0089_PW340	HDPE (no PTFE)	20 mL	00352010011161	Grey	No	
010	0089_PW340	HDPE (no PTFE)	20 mL	00352010011237	Grey	No	
011	0089_PW335	Clear Plastic Bottle - Natural	250 mL	00070520069531	Green	No	
011	0089_PW335	HDPE (no PTFE)	20 mL	00352010011228	Grey	No	
011	0089_PW335	HDPE (no PTFE)	20 mL	00352010011062	Grey	No	

Total Bottle Count: ALS: 39, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110022**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021 13:00
Order number	: DEF19009/730	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 26968	Issue Date	: 10-Sep-2021 08:15
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD335_210830	0089_SD364_210830	0089_SD341_210830	----	----
				Sampling date / time	30-Aug-2021 10:43	30-Aug-2021 10:53	30-Aug-2021 11:16	----	----
					EP2110022-001	EP2110022-002	EP2110022-003	--------	--------
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**26.4**	**24.5**	**30.5**	**----**	**----**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	**----**	**----**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	**----**	**----**
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**----**	**----**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	**----**	**----**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD335_210830	0089_SD364_210830	0089_SD341_210830	----	----
				Sampling date / time	30-Aug-2021 10:43	30-Aug-2021 10:53	30-Aug-2021 11:16	----	----
Compound	CAS Number	LOR	Unit		EP2110022-001	EP2110022-002	EP2110022-003	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**94.0**	**92.0**	**90.5**	----	----
13C8-PFOA	----	0.0002	%		**96.5**	**101**	**96.5**	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110022**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 26968	Issue Date	: 10-Sep-2021
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3891683)									
EP2110018-001	Anonymous	EA055: Moisture Content	----	0.1	%	26.4	26.3	0.0	0% - 20%
EP2110018-012	Anonymous	EA055: Moisture Content	----	0.1	%	19.6	19.6	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3885861)									
EP2110018-011	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2110023-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3885861)									
EP2110018-011	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3885861) - continued									
EP2110018-011	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2110023-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3885861)									
EP2110018-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110023-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3885861)									
EP2110018-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110023-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885861)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885861)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	82.0	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.4	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885861)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.2	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.7	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.6	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	91.5	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.0	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885861)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	127	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	87.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	87.6	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885861) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	84.0	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885861)							
EP2110018-011	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	73.6	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	85.2	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	78.8	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	83.2	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	76.0	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	85.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885861)							
EP2110018-011	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	77.8	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	84.8	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	84.4	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	95.6	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	88.8	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	90.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	84.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	81.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	78.4	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	70.0	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	96.8	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885861)							
EP2110018-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	78.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	78.4	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	86.7	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	80.8	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	84.9	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	92.4	63.0	144

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885861) - continued							
EP2110018-011	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	84.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885861)							
EP2110018-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	77.6	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	82.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	89.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	84.4	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110022**	Page	: 1 of 4
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Site	: DEF19009/Stirling	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 3
Order number	: DEF19009/730	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
0089_SD335_210830, 0089_SD364_210830, 0089_SD341_210830	**30-Aug-2021**	**----**	----	----	**08-Sep-2021**	13-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD335_210830, 0089_SD364_210830, 0089_SD341_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD335_210830, 0089_SD364_210830, 0089_SD341_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD335_210830, 0089_SD364_210830, 0089_SD341_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD335_210830, 0089_SD364_210830, 0089_SD341_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD335_210830, 0089_SD364_210830, 0089_SD341_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110022**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 26968	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 31-Aug-2021 13:00	Issue Date	: 01-Sep-2021
Client Requested Due Date	: 10-Sep-2021	Scheduled Reporting Date	: **10-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 9.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2110022-001	30-Aug-2021 10:43	0089_SD335_210830	✓	✓
EP2110022-002	30-Aug-2021 10:53	0089_SD364_210830	✓	✓
EP2110022-003	30-Aug-2021 11:16	0089_SD341_210830	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2110022

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: Def19009_0089 **Client:** Department of defence. **Project Manager:** [redacted]
Phone:

ALS Compass COC Reference: **# Samples:** **Sampler:**
COC 26947; 26945; 26968; 26949; 26962; 26977; 26951; 26948;
Phone:

Turnaround Requirements: Standard Urgent

Special Instructions:

[redacted]

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 30/8/21	Date / Time: 31/8 1300	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: **26968** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD335		30/08/2021 10:43 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
002	0089_SD364		30/08/2021 10:53 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
003	0089_SD341		30/08/2021 11:16 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		

CHAIN OF CUSTODY

COC#: **26968** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SD335	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
002	0089_SD364	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
003	0089_SD341	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **26968** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD335	HDPE Soil Jar	200 mL	00621019058310	Grey	No	
002	0089_SD364	HDPE Soil Jar	200 mL	00621019058219	Grey	No	
003	0089_SD341	HDPE Soil Jar	200 mL	00621019058258	Grey	No	

Total Bottle Count: ALS: 3, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110023**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021 13:00
Order number	: DEF19009/730	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 26977	Issue Date	: 10-Sep-2021 08:15
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD340_210830	0089_QC107_210830	0089_SD362_210830	0089_SD363_210830	----
			Sampling date / time	30-Aug-2021 11:03	30-Aug-2021 11:03	30-Aug-2021 11:09	30-Aug-2021 11:26	----
Compound	CAS Number	LOR	Unit	EP2110023-001	EP2110023-002	EP2110023-003	EP2110023-004	--------
				Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**23.9**	**28.0**	**30.1**	**29.2**	**----**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	**----**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	**----**
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	**----**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD340_210830	0089_QC107_210830	0089_SD362_210830	0089_SD363_210830	----
				Sampling date / time	30-Aug-2021 11:03	30-Aug-2021 11:03	30-Aug-2021 11:09	30-Aug-2021 11:26	----
Compound	CAS Number	LOR	Unit		EP2110023-001	EP2110023-002	EP2110023-003	EP2110023-004	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**92.5**	**92.5**	**91.0**	**96.5**	----
13C8-PFOA	----	0.0002	%		**102**	**102**	**98.0**	**95.0**	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110023**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 06-Sep-2021
C-O-C number	: 26977	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3891684)									
EP2110023-003	0089_SD362_210830	EA055: Moisture Content	----	0.1	%	30.1	29.4	2.2	0% - 20%
ES2132330-007	Anonymous	EA055: Moisture Content	----	0.1	%	35.7	34.0	4.9	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3885861)									
EP2110018-011	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2110023-003	0089_SD362_210830	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3885861)									
EP2110018-011	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3885861) - continued									
EP2110018-011	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2110023-003	0089_SD362_210830	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3885861)									
EP2110018-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110023-003	0089_SD362_210830	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3885861)									
EP2110018-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110023-003	0089_SD362_210830	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885861)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885861)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	82.0	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.4	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885861)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.2	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.7	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.6	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	91.5	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.0	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885861)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	127	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	87.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	87.6	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885861) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	84.0	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3885861)							
EP2110018-011	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	73.6	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	85.2	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	78.8	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	83.2	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	76.0	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	85.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3885861)							
EP2110018-011	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	77.8	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	84.8	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	84.4	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	95.6	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	88.8	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	90.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	84.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	81.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	78.4	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	70.0	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	96.8	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885861)							
EP2110018-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	78.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	78.4	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	86.7	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	80.8	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	84.9	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	92.4	63.0	144

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3885861) - continued							
EP2110018-011	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	84.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3885861)							
EP2110018-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	77.6	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	82.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	89.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	84.4	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110023**	Page	: 1 of 4
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 31-Aug-2021
Site	: DEF19009/Stirling	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 4
Order number	: DEF19009/730	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
0089_SD340_210830, 0089_QC107_210830, 0089_SD362_210830, 0089_SD363_210830	**30-Aug-2021**	**----**	----	----	**08-Sep-2021**	13-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD340_210830, 0089_QC107_210830, 0089_SD362_210830, 0089_SD363_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD340_210830, 0089_QC107_210830, 0089_SD362_210830, 0089_SD363_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD340_210830, 0089_QC107_210830, 0089_SD362_210830, 0089_SD363_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD340_210830, 0089_QC107_210830, 0089_SD362_210830, 0089_SD363_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD340_210830, 0089_QC107_210830, 0089_SD362_210830, 0089_SD363_210830	**30-Aug-2021**	**06-Sep-2021**	26-Feb-2022	✓	**07-Sep-2021**	16-Oct-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110023**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 26977	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 31-Aug-2021 13:00	Issue Date	: 01-Sep-2021
Client Requested Due Date	: 10-Sep-2021	Scheduled Reporting Date	: **10-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 9.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2110023-001	30-Aug-2021 11:03	0089_SD340_210830	✓	✓
EP2110023-002	30-Aug-2021 11:03	0089_QC107_210830	✓	✓
EP2110023-003	30-Aug-2021 11:09	0089_SD362_210830	✓	✓
EP2110023-004	30-Aug-2021 11:26	0089_SD363_210830	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110023

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: Def19009_0099 **Client:** Department of defence. **Project Manager:** [redacted]

Phone: [redacted]

ALS Compass COC Reference: **# Samples:** **Sampler:**

COC 26947; 26945; 26968; 26949; 26962; 26977; 26951; 26948;

Phone:

Turnaround Requirements: Standard Urgent

Special Instructions:

[redacted]

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 30/8/21	Date / Time: 31/8 1300	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: 26977 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19089/Stirling SED JS

ORDER NO: DEF19089/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD340		30/08/2021 11:03 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
002	0089_QC107		30/08/2021 11:03 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
003	0089_SD362		30/08/2021 11:09 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
004	0089_SD363		30/08/2021 11:26 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		

CHAIN OF CUSTODY

COC#: **26977** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling SED JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SD340	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
002	0089_QC107	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
003	0089_SD362	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
004	0089_SD363	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **26977** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling SED JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD340	HDPE Soil Jar	200 mL	00621019043005	Grey	No	
002	0089_QC107	HDPE Soil Jar	200 mL	00621019058330	Grey	No	
003	0089_SD362	HDPE Soil Jar	200 mL	00621019043016	Grey	No	
004	0089_SD363	HDPE Soil Jar	200 mL	00621019058298	Grey	No	

Total Bottle Count: ALS: 4, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110064**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021 13:15
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27023	Issue Date	: 13-Sep-2021 17:04
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 8		
No. of samples analysed	: 8		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC401_210831	0089_MW217_210831	0089_MW282_210831	0089_MW224_210831	0089_MW517_210831
				Sampling date / time	31-Aug-2021 08:07	31-Aug-2021 09:52	31-Aug-2021 09:52	31-Aug-2021 09:53	31-Aug-2021 10:04
Compound	CAS Number	LOR	Unit		EP2110064-002	EP2110064-004	EP2110064-005	EP2110064-006	EP2110064-007
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	276	492	225	232
Total Alkalinity as CaCO3	----	1	mg/L		----	276	492	225	232
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	36	17	39	15
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	51	40	125	231
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	104	148	56	81
Magnesium	7439-95-4	1	mg/L		----	11	20	21	17
Sodium	7440-23-5	1	mg/L		----	41	30	83	99
Potassium	7440-09-7	1	mg/L		----	6	<1	4	5
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		----	7.70	11.3	8.83	11.5
ø Total Cations	----	0.01	meq/L		----	8.03	10.3	8.24	9.88
ø Ionic Balance	----	0.01	%		----	2.09	4.51	3.50	7.44
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.02	1.68	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.02	3.51	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	0.04	34.0	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	3.93	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	0.04	45.1	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	1.3	0.6	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	6.95	1.05	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	7.76	7.00	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	0.93	1.48	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC401_210831	0089_MW217_210831	0089_MW282_210831	0089_MW224_210831	0089_MW517_210831
				Sampling date / time	31-Aug-2021 08:07	31-Aug-2021 09:52	31-Aug-2021 09:52	31-Aug-2021 09:53	31-Aug-2021 10:04
Compound	CAS Number	LOR	Unit		EP2110064-002	EP2110064-004	EP2110064-005	EP2110064-006	EP2110064-007
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.38**	**9.37**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	**0.03**	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	**38.5**	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	**0.24**	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC401_210831	0089_MW217_210831	0089_MW282_210831	0089_MW224_210831	0089_MW517_210831
				Sampling date / time	31-Aug-2021 08:07	31-Aug-2021 09:52	31-Aug-2021 09:52	31-Aug-2021 09:53	31-Aug-2021 10:04
					EP2110064-002	EP2110064-004	EP2110064-005	EP2110064-006	EP2110064-007
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**56.2**	**108**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.08**	**79.1**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**56.2**	**100**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**111**	**105**	**71.5**	**102**	**105**
13C8-PFOA	----	0.02	%		**103**	**102**	**99.9**	**98.5**	**98.1**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW256_210831	----	----	----	----
				Sampling date / time	31-Aug-2021 10:35	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110064-008	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**345**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**345**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**64**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**403**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**149**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**27**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**170**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**9**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**19.6**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**17.3**	----	----	----	----
ø Ionic Balance	----	0.01	%		**6.27**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**1.67**	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.83**	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**6.42**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.26**	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**12.0**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.6**	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.78**	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**2.34**	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.19**	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW256_210831	----	----	----	----
				Sampling date / time	31-Aug-2021 10:35	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110064-008	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.45**	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		**0.07**	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**0.25**	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW256_210831	----	----	----	----
				Sampling date / time	31-Aug-2021 10:35	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110064-008	--------	--------	--------	--------
					Result	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**25.9**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**18.4**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**24.7**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**101**	----	----	----	----
13C8-PFOA	----	0.02	%		**98.0**	----	----	----	----

Analytical Results

Sub-Matrix: **RINSATE** (Matrix: **WATER**)				Sample ID	0089_QC403_210831	0089_QC402_210831	----	----	----
				Sampling date / time	31-Aug-2021 08:06	31-Aug-2021 08:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2110064-001	EP2110064-003	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0089_QC403_210831	0089_QC402_210831	----	----	----
				Sampling date / time	31-Aug-2021 08:06	31-Aug-2021 08:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2110064-001	EP2110064-003	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.0**	**103**	----	----	----
13C8-PFOA	----	0.02	%		**99.7**	**99.5**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **RINSATE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110064**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27023	Issue Date	: 13-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 8		
No. of samples analysed	: 8		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3880384)									
EP2110021-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	120	118	1.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	120	118	1.6	0% - 20%
EP2110021-012	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	201	206	2.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	201	206	2.3	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3881214)									
EP2110064-004	0089_MW217_210831	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	36	35	0.0	0% - 20%
EP2110065-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2430	2420	0.3	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3881213)									
EP2110064-004	0089_MW217_210831	ED045G: Chloride	16887-00-6	1	mg/L	51	51	0.0	0% - 20%
EP2110065-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	17600	17700	0.5	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3882704)									
EP2109734-047	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	49	46	6.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	36	34	5.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	36	35	3.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	10	0.0	0% - 50%
EP2109734-061	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	46	46	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	32	32	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	33	33	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	9	9	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3887262)									
EP2110064-007	0089_MW517_210831	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110065-010	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3887262)									
EP2110064-007	0089_MW517_210831	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110065-010	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3887262)									
EP2110064-007	0089_MW517_210831	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3887262) - continued									
EP2110064-007	0089_MW517_210831	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110065-010	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3887262)									
EP2110064-007	0089_MW517_210831	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110065-010	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3887262)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 3887262) - continued									
EP2110064-007	0089_MW517_210831	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110065-010	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3880384)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	100	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881214)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	93.4	87.7	113
				<1	500 mg/L	97.0	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3881213)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	92.0	87.9	114
				<1	1000 mg/L	101	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3882704)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.2	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	89.9	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887262)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	99.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	96.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	117	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	115	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	87.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887262)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	100	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	110	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887262) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	92.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	116	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887262)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	96.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	95.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	101	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	89.3	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	136	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	83.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887262)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	109	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	96.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	127	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	111	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881214)							
EP2110064-004	0089_MW217_210831	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	92.8	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3881213)							
EP2110064-004	0089_MW217_210831	ED045G: Chloride	16887-00-6	1000 mg/L	98.3	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887262)							
EP2110065-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	94.8	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	103	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	94.4	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	112	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	99.6	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	95.4	53.0	142

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887262)							
EP2110065-009	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.4	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	101	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	101	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	102	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	107	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	93.4	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	85.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	97.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	85.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	120	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887262)							
EP2110065-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	104	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	97.7	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	106	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	106	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	92.4	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	117	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	72.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887262)							
EP2110065-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	103	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	98.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	118	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	96.6	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110064**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 13-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 8
Order number	: DEF19009/730	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW217_210831, 0089_MW282_210831, 0089_MW224_210831, 0089_MW517_210831, 0089_MW256_210831	**31-Aug-2021**	**----**	----	----	**02-Sep-2021**	14-Sep-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW217_210831, 0089_MW282_210831, 0089_MW224_210831, 0089_MW517_210831, 0089_MW256_210831	**31-Aug-2021**	**----**	----	----	**13-Sep-2021**	28-Sep-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW217_210831, 0089_MW282_210831, 0089_MW224_210831, 0089_MW517_210831, 0089_MW256_210831	**31-Aug-2021**	**----**	----	----	**13-Sep-2021**	28-Sep-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW217_210831, 0089_MW282_210831, 0089_MW224_210831, 0089_MW517_210831, 0089_MW256_210831	**31-Aug-2021**	**----**	----	----	**03-Sep-2021**	07-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_QC403_210831, 0089_QC401_210831, 0089_QC402_210831, 0089_MW217_210831, 0089_MW282_210831, 0089_MW224_210831, 0089_MW517_210831, 0089_MW256_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_QC403_210831, 0089_QC401_210831, 0089_QC402_210831, 0089_MW217_210831, 0089_MW282_210831, 0089_MW224_210831, 0089_MW517_210831, 0089_MW256_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_QC403_210831, 0089_QC401_210831, 0089_QC402_210831, 0089_MW217_210831, 0089_MW282_210831, 0089_MW224_210831, 0089_MW517_210831, 0089_MW256_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_QC403_210831, 0089_QC401_210831, 0089_QC402_210831, 0089_MW217_210831, 0089_MW282_210831, 0089_MW224_210831, 0089_MW517_210831, 0089_MW256_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_QC403_210831, 0089_QC401_210831, 0089_QC402_210831, 0089_MW217_210831, 0089_MW282_210831, 0089_MW224_210831, 0089_MW517_210831, 0089_MW256_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110064**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27023	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 01-Sep-2021 13:15	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 13-Sep-2021	Scheduled Reporting Date	: **13-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 8.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 8 / 8

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110064-001	31-Aug-2021 08:06	0089_QC403_210831		✓		
EP2110064-002	31-Aug-2021 08:07	0089_QC401_210831		✓		
EP2110064-003	31-Aug-2021 08:08	0089_QC402_210831		✓		
EP2110064-004	31-Aug-2021 09:52	0089_MW217_210831	✓	✓	✓	✓
EP2110064-005	31-Aug-2021 09:52	0089_MW282_210831	✓	✓	✓	✓
EP2110064-006	31-Aug-2021 09:53	0089_MW224_210831	✓	✓	✓	✓
EP2110064-007	31-Aug-2021 10:04	0089_MW517_210831	✓	✓	✓	✓
EP2110064-008	31-Aug-2021 10:35	0089_MW256_210831	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2110064

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno **Project Manager** [redacted]

Phone:

ALS Compass COC Reference: 27041, 27043, 27042, 27025, 27027, 27023, 27030, 27056 **# Samples:**

Sampler:

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send 1 esky to Eurofins for trips.

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time:	**Date / Time:**	**Date / Time:**	**Date / Time:**
31/08/21, 5pm	1/9/21 1315		

CHAIN OF CUSTODY

ALS COC#: 27023 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_QC403		31/08/2021 08:06 AM	Water	ALS: 2 Non ALS: 0	No		X		
002	0089_QC401		31/08/2021 08:07 AM	Water	ALS: 2 Non ALS: 0	No		X		
003	0089_QC402		31/08/2021 08:08 AM	Water	ALS: 2 Non ALS: 0	No		X		
004	0089_MW217		31/08/2021 09:52 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
005	0089_MW282		31/08/2021 09:52 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
006	0089_MW224		31/08/2021 09:53 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
007	0089_MW517	2 extra lab qc pfas bottles	31/08/2021 10:04 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8			
008	0089_MW256		31/08/2021 10:35 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			

CHAIN OF CUSTODY

ALS COC#: 27023 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
004	0089_MW217	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW282	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0089_MW224	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW517	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW256	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: 27023 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_QC403	HDPE (no PTFE)	20 mL	00350019047338	Grey	No	
001	0089_QC403	HDPE (no PTFE)	20 mL	00350019047400	Grey	No	
002	0089_QC401	HDPE (no PTFE)	20 mL	00350019047448	Grey	No	
002	0089_QC401	HDPE (no PTFE)	20 mL	00350019047427	Grey	No	
003	0089_QC402	HDPE (no PTFE)	20 mL	00350019047420	Grey	No	
003	0089_QC402	HDPE (no PTFE)	20 mL	00350019047396	Grey	No	
004	0089_MW217	Clear Plastic Bottle - Natural	250 mL	00070520069512	Green	No	
004	0089_MW217	HDPE (no PTFE)	20 mL	00352010011261	Grey	No	
004	0089_MW217	HDPE (no PTFE)	20 mL	00352010011323	Grey	No	
005	0089_MW282	Clear Plastic Bottle - Natural	250 mL	00070520069546	Green	No	
005	0089_MW282	HDPE (no PTFE)	20 mL	00352010011283	Grey	No	
005	0089_MW282	HDPE (no PTFE)	20 mL	00352010011202	Grey	No	
006	0089_MW224	Clear Plastic Bottle - Natural	250 mL	00070520069540	Green	No	
006	0089_MW224	HDPE (no PTFE)	20 mL	00352010011275	Grey	No	
006	0089_MW224	HDPE (no PTFE)	20 mL	00352010011297	Grey	No	
007	0089_MW517	Clear Plastic Bottle - Natural	250 mL	00070520069535	Green	No	
007	0089_MW517	HDPE (no PTFE)	20 mL	00352010011350	Grey	No	
007	0089_MW517	HDPE (no PTFE)	20 mL	00350019164153	Grey	No	
007	0089_MW517	HDPE (no PTFE)	20 mL	00352010011222	Grey	No	
008	0089_MW256	Clear Plastic Bottle - Natural	250 mL	00070520069522	Green	No	
008	0089_MW256	HDPE (no PTFE)	20 mL	00352010011216	Grey	No	
008	0089_MW256	HDPE (no PTFE)	20 mL	00352010011193	Grey	No	

Total Bottle Count: ALS: 23, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110065**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021 13:15
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27025	Issue Date	: 13-Sep-2021 11:28
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW314_210831	0089_PW307_210831	0089_PW316_210831	0089_QC117_210831	0089_PW405_210831
				Sampling date / time	31-Aug-2021 11:43	31-Aug-2021 12:01	31-Aug-2021 12:18	31-Aug-2021 14:00	31-Aug-2021 14:01
					EP2110065-003	EP2110065-005	EP2110065-006	EP2110065-007	EP2110065-008
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**117**	**117**	**142**	**133**	**132**
Total Alkalinity as CaCO3	----	1	mg/L		**117**	**117**	**142**	**133**	**132**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2450**	**2420**	**2430**	**2400**	**2410**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**18000**	**17700**	**17600**	**17600**	**17900**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**402**	**406**	**410**	**417**	**407**
Magnesium	7439-95-4	1	mg/L		**1320**	**1320**	**1330**	**1330**	**1310**
Sodium	7440-23-5	1	mg/L		**10200**	**10300**	**10200**	**10300**	**10100**
Potassium	7440-09-7	1	mg/L		**521**	**526**	**529**	**531**	**515**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**561**	**552**	**550**	**549**	**558**
ø Total Cations	----	0.01	meq/L		**586**	**590**	**587**	**592**	**581**
ø Ionic Balance	----	0.01	%		**2.14**	**3.36**	**3.27**	**3.75**	**2.01**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.02**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	**0.02**	**0.02**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW314_210831	0089_PW307_210831	0089_PW316_210831	0089_QC117_210831	0089_PW405_210831
				Sampling date / time	31-Aug-2021 11:43	31-Aug-2021 12:01	31-Aug-2021 12:18	31-Aug-2021 14:00	31-Aug-2021 14:01
					EP2110065-003	EP2110065-005	EP2110065-006	EP2110065-007	EP2110065-008
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW314_210831	0089_PW307_210831	0089_PW316_210831	0089_QC117_210831	0089_PW405_210831
				Sampling date / time	31-Aug-2021 11:43	31-Aug-2021 12:01	31-Aug-2021 12:18	31-Aug-2021 14:00	31-Aug-2021 14:01
Compound	CAS Number	LOR	Unit		EP2110065-003	EP2110065-005	EP2110065-006	EP2110065-007	EP2110065-008
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	**0.02**	**0.04**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	**0.02**	**0.04**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**95.0**	**101**	**99.1**	**89.6**	**107**
13C8-PFOA	----	0.02	%		**97.1**	**97.7**	**101**	**96.4**	**99.1**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW407_210831	0089_PW409_210831	----	----	----
				Sampling date / time	31-Aug-2021 14:23	31-Aug-2021 14:41	----	----	----
Compound	CAS Number	LOR	Unit		EP2110065-010	EP2110065-011	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**135**	**124**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**135**	**124**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2440**	**2470**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**17800**	**17700**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**408**	**414**	----	----	----
Magnesium	7439-95-4	1	mg/L		**1310**	**1320**	----	----	----
Sodium	7440-23-5	1	mg/L		**10100**	**10200**	----	----	----
Potassium	7440-09-7	1	mg/L		**521**	**521**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**556**	**553**	----	----	----
ø Total Cations	----	0.01	meq/L		**581**	**586**	----	----	----
ø Ionic Balance	----	0.01	%		**2.22**	**2.90**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW407_210831	0089_PW409_210831	----	----	----
				Sampling date / time	31-Aug-2021 14:23	31-Aug-2021 14:41	----	----	----
Compound	CAS Number	LOR	Unit		EP2110065-010	EP2110065-011	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)				Sample ID	**0089_PW407_210831**	**0089_PW409_210831**	**----**	**----**	**----**
				Sampling date / time	31-Aug-2021 14:23	31-Aug-2021 14:41	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2110065-010**	**EP2110065-011**	**--------**	**--------**	**--------**
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	**----**	**----**	**----**
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**----**	**----**	**----**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**----**	**----**	**----**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**----**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**91.2**	**102**	**----**	**----**	**----**
13C8-PFOA	----	0.02	%		**101**	**102**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_QC114_210831	0089_SW309_210831	0089_SW310_210831	0089_SW406_210831	0089_SW410_210831
				Sampling date / time	31-Aug-2021 11:32	31-Aug-2021 11:33	31-Aug-2021 11:52	31-Aug-2021 14:09	31-Aug-2021 14:47
Compound	CAS Number	LOR	Unit		EP2110065-001	EP2110065-002	EP2110065-004	EP2110065-009	EP2110065-012
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		117	117	116	123	124
Total Alkalinity as CaCO3	----	1	mg/L		117	117	116	123	124
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2460	2450	2440	2360	2450
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17800	17800	18000	17500	17500
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		399	400	406	406	412
Magnesium	7439-95-4	1	mg/L		1300	1300	1320	1310	1310
Sodium	7440-23-5	1	mg/L		9970	10100	10200	10000	10200
Potassium	7440-09-7	1	mg/L		516	517	522	518	522
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		556	555	561	545	547
ø Total Cations	----	0.01	meq/L		574	579	586	576	585
ø Ionic Balance	----	0.01	%		1.60	2.12	2.18	2.77	3.38
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	0.08	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	0.08	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC114_210831	0089_SW309_210831	0089_SW310_210831	0089_SW406_210831	0089_SW410_210831
				Sampling date / time	31-Aug-2021 11:32	31-Aug-2021 11:33	31-Aug-2021 11:52	31-Aug-2021 14:09	31-Aug-2021 14:47
					EP2110065-001	EP2110065-002	EP2110065-004	EP2110065-009	EP2110065-012
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_QC114_210831	0089_SW309_210831	0089_SW310_210831	0089_SW406_210831	0089_SW410_210831
				Sampling date / time	31-Aug-2021 11:32	31-Aug-2021 11:33	31-Aug-2021 11:52	31-Aug-2021 14:09	31-Aug-2021 14:47
Compound	CAS Number	LOR	Unit		EP2110065-001	EP2110065-002	EP2110065-004	EP2110065-009	EP2110065-012
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	**0.16**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	**0.16**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**103**	**95.5**	**108**	**109**
13C8-PFOA	----	0.02	%		**102**	**96.9**	**100**	**98.8**	**100**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110065**	Page	: 1 of 13
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	[redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27025	Issue Date	: 13-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3880384)									
EP2110021-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	120	118	1.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	120	118	1.6	0% - 20%
EP2110021-012	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	201	206	2.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	201	206	2.3	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3880387)									
EP2110065-004	0089_SW310_210831	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	116	118	1.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	116	118	1.4	0% - 20%
EP2110068-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	122	121	0.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	122	121	0.9	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3881214)									
EP2110064-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	36	35	0.0	0% - 20%
EP2110065-006	0089_PW316_210831	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2430	2420	0.3	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3881213)									
EP2110064-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	51	51	0.0	0% - 20%
EP2110065-006	0089_PW316_210831	ED045G: Chloride	16887-00-6	1	mg/L	17600	17700	0.5	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 3882704)									
EP2109734-047	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	49	46	6.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	36	34	5.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	36	35	3.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	10	0.0	0% - 50%
EP2109734-061	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	46	46	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	32	32	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	33	33	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	9	9	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3882705)									
EP2110065-002	0089_SW309_210831	ED093F: Calcium	7440-70-2	1	mg/L	400	416	3.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1300	1350	3.9	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10100	10500	3.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	517	536	3.7	0% - 20%
EP2110065-012	0089_SW410_210831	ED093F: Calcium	7440-70-2	1	mg/L	412	416	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1310	1340	1.9	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10200	10300	1.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	522	530	1.6	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3887262)									
EP2110064-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110065-010	0089_PW407_210831	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	89.9	92.5	2.9	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.63	0.64	1.9	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	2.45	2.11	14.7	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3887459) - continued									
EP2110071-007	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	26.2	25.1	4.3	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	2.44	2.19	10.5	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3887262)									
EP2110064-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110065-010	0089_PW407_210831	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	2.47	2.37	4.0	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.64	1.59	3.5	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3887459) - continued									
EP2110071-007	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	16.1	14.0	13.7	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.58	0.53	8.7	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.4	0.4	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3887262)									
EP2110064-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110065-010	0089_PW407_210831	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3887459) - continued									
EP2110068-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3887262)									
EP2110064-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110065-010	0089_PW407_210831	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3887459)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3887459) - continued									
EP2110068-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110071-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.08	0.08	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3887262)									
EP2110064-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110065-010	0089_PW407_210831	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	143	142	1.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3880384)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	100	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3880387)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	108	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881214)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	93.4	87.7	113
				<1	500 mg/L	97.0	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3881213)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	92.0	87.9	114
				<1	1000 mg/L	101	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3882704)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.2	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.8	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	89.9	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3882705)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	92.2	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	93.7	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	91.0	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.5	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887262)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	99.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	96.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	117	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887262) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	115	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	87.0	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887459)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	106	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	99.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887262)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	100	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	106	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	110	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	92.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	116	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	103	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	113	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	121	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887262)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	96.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	95.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.6	147

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887262) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	101	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	89.3	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	136	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	83.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887459)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	122	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	108	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	100	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	119	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	100	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	101	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	84.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887262)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	109	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	96.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	127	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	111	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887459)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	128	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	120	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	129	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	100	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881214)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881214) - continued							
EP2110064-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	92.8	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3881213)							
EP2110064-004	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	98.3	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887262)							
EP2110065-009	0089_SW406_210831	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	94.8	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	103	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	94.4	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	112	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	99.6	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	95.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	111	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	127	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	113	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	115	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	90.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	99.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887262)							
EP2110065-009	0089_SW406_210831	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.4	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	101	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	101	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	102	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	107	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	93.4	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	85.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	97.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	85.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	120	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	100	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	109	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	106	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	105	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	113	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	107	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	99.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	98.6	69.0	133

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459) - continued							
EP2110071-005	Anonymous	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	102	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	132	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887262)							
EP2110065-009	0089_SW406_210831	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	104	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	97.7	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	106	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	106	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	92.4	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	117	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	72.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	114	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	95.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	92.9	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	102	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	90.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	110	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	86.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887262)							
EP2110065-009	0089_SW406_210831	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	103	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	98.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	118	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	96.6	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	138	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	111	67.0	138

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887459) - continued							
EP2110071-005	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	84.2	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110065**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 13-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 12
Order number	: DEF19009/730	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_QC114_210831, 0089_SW309_210831, 0089_PW314_210831, 0089_SW310_210831, 0089_PW307_210831, 0089_PW316_210831, 0089_QC117_210831, 0089_PW405_210831, 0089_SW406_210831, 0089_PW407_210831, 0089_PW409_210831, 0089_SW410_210831	**31-Aug-2021**	**----**	----	----	**02-Sep-2021**	14-Sep-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_QC114_210831, 0089_SW309_210831, 0089_PW314_210831, 0089_SW310_210831, 0089_PW307_210831, 0089_PW316_210831, 0089_QC117_210831, 0089_PW405_210831, 0089_SW406_210831, 0089_PW407_210831, 0089_PW409_210831, 0089_SW410_210831	**31-Aug-2021**	**----**	----	----	**13-Sep-2021**	28-Sep-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_QC114_210831, 0089_SW309_210831, 0089_PW314_210831, 0089_SW310_210831, 0089_PW307_210831, 0089_PW316_210831, 0089_QC117_210831, 0089_PW405_210831, 0089_SW406_210831, 0089_PW407_210831, 0089_PW409_210831, 0089_SW410_210831	**31-Aug-2021**	**----**	----	----	**13-Sep-2021**	28-Sep-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_QC114_210831, 0089_SW309_210831, 0089_PW314_210831, 0089_SW310_210831, 0089_PW307_210831, 0089_PW316_210831, 0089_QC117_210831, 0089_PW405_210831, 0089_SW406_210831, 0089_PW407_210831, 0089_PW409_210831, 0089_SW410_210831	**31-Aug-2021**	**----**	----	----	**03-Sep-2021**	07-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_QC114_210831,	0089_SW309_210831,	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
0089_PW314_210831,	0089_SW310_210831,							
0089_PW307_210831,	0089_PW316_210831,							
0089_QC117_210831,	0089_PW405_210831,							
0089_SW406_210831,	0089_PW407_210831,							
0089_PW409_210831,	0089_SW410_210831							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0089_QC114_210831,	0089_SW309_210831,	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
0089_PW314_210831,	0089_SW310_210831,							
0089_PW307_210831,	0089_PW316_210831,							
0089_QC117_210831,	0089_PW405_210831,							
0089_SW406_210831,	0089_PW407_210831,							
0089_PW409_210831,	0089_SW410_210831							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0089_QC114_210831,	0089_SW309_210831,	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
0089_PW314_210831,	0089_SW310_210831,							
0089_PW307_210831,	0089_PW316_210831,							
0089_QC117_210831,	0089_PW405_210831,							
0089_SW406_210831,	0089_PW407_210831,							
0089_PW409_210831,	0089_SW410_210831							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_QC114_210831,	0089_SW309_210831,	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
0089_PW314_210831,	0089_SW310_210831,							
0089_PW307_210831,	0089_PW316_210831,							
0089_QC117_210831,	0089_PW405_210831,							
0089_SW406_210831,	0089_PW407_210831,							
0089_PW409_210831,	0089_SW410_210831							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0089_QC114_210831,	0089_SW309_210831,	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
0089_PW314_210831,	0089_SW310_210831,							
0089_PW307_210831,	0089_PW316_210831,							
0089_QC117_210831,	0089_PW405_210831,							
0089_SW406_210831,	0089_PW407_210831,							
0089_PW409_210831,	0089_SW410_210831							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110065**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27025	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 01-Sep-2021 13:15	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 13-Sep-2021	Scheduled Reporting Date	: **13-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 8.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110065-001	31-Aug-2021 11:32	0089_QC114_210831	✓	✓	✓	✓
EP2110065-002	31-Aug-2021 11:33	0089_SW309_210831	✓	✓	✓	✓
EP2110065-003	31-Aug-2021 11:43	0089_PW314_210831	✓	✓	✓	✓
EP2110065-004	31-Aug-2021 11:52	0089_SW310_210831	✓	✓	✓	✓
EP2110065-005	31-Aug-2021 12:01	0089_PW307_210831	✓	✓	✓	✓
EP2110065-006	31-Aug-2021 12:18	0089_PW316_210831	✓	✓	✓	✓
EP2110065-007	31-Aug-2021 14:00	0089_QC117_210831	✓	✓	✓	✓
EP2110065-008	31-Aug-2021 14:01	0089_PW405_210831	✓	✓	✓	✓
EP2110065-009	31-Aug-2021 14:09	0089_SW406_210831	✓	✓	✓	✓
EP2110065-010	31-Aug-2021 14:23	0089_PW407_210831	✓	✓	✓	✓
EP2110065-011	31-Aug-2021 14:41	0089_PW409_210831	✓	✓	✓	✓
EP2110065-012	31-Aug-2021 14:47	0089_SW410_210831	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2110065

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno **Project Manager** [redacted]

ALS Compass COC Reference: 27027, 27028, 27029, 27030, 27056 **# Samples:** **Phone:**

27027, 27023, 27030, 27056

Sampler:

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send 1 esky to Eurofins for trip.

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time:	Date / Time:	Date / Time:	Date / Time:
31/08/21, 5pm	1/9/21 1315		

CHAIN OF CUSTODY

(ALS) COC#: **27025** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_QC114		31/08/2021 11:32 AM	Water	ALS: 3 Non ALS: 0	No	Partial 7/8		
002	0089_SW309		31/08/2021 11:33 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0089_PW314		31/08/2021 11:43 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0089_SW310		31/08/2021 11:52 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0089_PW307		31/08/2021 12:01 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0089_PW316		31/08/2021 12:18 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
007	0089_QC117		31/08/2021 02:00 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
008	0089_PW405		31/08/2021 02:01 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
009	0089_SW406	2 extra lab qc pfas bottles	31/08/2021 02:09 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 27025 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_PW407	2 extra lab qc pfas bottles	31/08/2021 02:23 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		
011	0089_PW409		31/08/2021 02:41 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
012	0089_SW410		31/08/2021 02:47 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 27025 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_QC114	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_SW309	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW314	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW310	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_PW307	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0089_PW316	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_QC117	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_PW405	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_SW406	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 27025 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO:

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

010	0089_PW407	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_PW409	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
012	0089_SW410	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: 27025 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_QC114	Clear Plastic Bottle - Natural	250 mL	00071018014750	Green	No	
001	0089_QC114	HDPE (no PTFE)	20 mL	00350019151452	Grey	No	
001	0089_QC114	HDPE (no PTFE)	20 mL	00350019151368	Grey	No	
002	0089_SW309	Clear Plastic Bottle - Natural	250 mL	00071018014844	Green	No	
002	0089_SW309	HDPE (no PTFE)	20 mL	00350019130681	Grey	No	
002	0089_SW309	HDPE (no PTFE)	20 mL	00350019151390	Grey	No	
003	0089_PW314	Clear Plastic Bottle - Natural	250 mL	00070520069536	Green	No	
003	0089_PW314	HDPE (no PTFE)	20 mL	00352010011351	Grey	No	
003	0089_PW314	HDPE (no PTFE)	20 mL	00352010011157	Grey	No	
004	0089_SW310	HDPE (no PTFE)	20 mL	00352010011288	Grey	No	
004	0089_SW310	HDPE (no PTFE)	20 mL	00352010011154	Grey	No	
004	0089_SW310	Clear Plastic Bottle - Natural	250 mL	00070520069533	Green	No	
005	0089_PW307	Clear Plastic Bottle - Natural	250 mL	00070520069543	Green	No	
005	0089_PW307	HDPE (no PTFE)	20 mL	00352010011092	Grey	No	
005	0089_PW307	HDPE (no PTFE)	20 mL	00352010011179	Grey	No	
006	0089_PW316	Clear Plastic Bottle - Natural	250 mL	00070520069515	Green	No	
006	0089_PW316	HDPE (no PTFE)	20 mL	00352010011156	Grey	No	
006	0089_PW316	HDPE (no PTFE)	20 mL	00352010011363	Grey	No	
007	0089_QC117	HDPE (no PTFE)	20 mL	00350019130901	Grey	No	
007	0089_QC117	Clear Plastic Bottle - Natural	250 mL	00071018014826	Green	No	
007	0089_QC117	HDPE (no PTFE)	20 mL	00350019130803	Grey	No	
008	0089_PW405	Clear Plastic Bottle - Natural	250 mL	00071018014753	Green	No	
008	0089_PW405	HDPE (no PTFE)	20 mL	00350019130738	Grey	No	
008	0089_PW405	HDPE (no PTFE)	20 mL	00350019130692	Grey	No	
009	0089_SW406	HDPE (no PTFE)	20 mL	00350019151398	Grey	No	
009	0089_SW406	HDPE (no PTFE)	20 mL	00350019130749	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 27025 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

009	0089						
009	0089_SW406	HDPE (no PTFE)	20 mL	00350019102555	Grey	No	
009	0089_SW406	HDPE (no PTFE)	20 mL	00350019151442	Grey	No	
010	0089_PW407	Clear Plastic Bottle - Natural	250 mL	00071018014743	Green	No	
010	0089_PW407	HDPE (no PTFE)	20 mL	00352010040507	Grey	No	
010	0089_PW407	HDPE (no PTFE)	20 mL	00350019164145	Grey	No	
010	0089_PW407	HDPE (no PTFE)	20 mL	00350019151642	Grey	No	
010	0089_PW407	HDPE (no PTFE)	20 mL	00350019151454	Grey	No	
011	0089_PW409	Clear Plastic Bottle - Natural	250 mL	00071018014805	Green	No	
011	0089_PW409	Clear Plastic Bottle - Natural	250 mL	00071018014814	Green	No	
011	0089_PW409	HDPE (no PTFE)	20 mL	00350019130915	Grey	No	
012	0089_SW410	HDPE (no PTFE)	20 mL	00350019151394	Grey	No	
012	0089_SW410	Clear Plastic Bottle - Natural	250 mL	00071018014819	Green	No	
012	0089_SW410	HDPE (no PTFE)	20 mL	00350019151526	Grey	No	
		HDPE (no PTFE)	20 mL	00350019151582	Grey	No	

Total Bottle Count: ALS: 40, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110067**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021 13:15
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27027	Issue Date	: 10-Sep-2021 14:26
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD307_210831	0089_SD314_210831	0089_SD316_210831	0089_SD405_210831	0089_SD407_210831
			Sampling date / time	31-Aug-2021 12:01	31-Aug-2021 12:03	31-Aug-2021 12:17	31-Aug-2021 13:59	31-Aug-2021 14:22
Compound	CAS Number	LOR	Unit	EP2110067-001	EP2110067-002	EP2110067-003	EP2110067-004	EP2110067-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**16.5**	**24.2**	**22.4**	**32.4**	**28.4**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD307_210831	0089_SD314_210831	0089_SD316_210831	0089_SD405_210831	0089_SD407_210831
				Sampling date / time	31-Aug-2021 12:01	31-Aug-2021 12:03	31-Aug-2021 12:17	31-Aug-2021 13:59	31-Aug-2021 14:22
Compound	CAS Number	LOR	Unit		EP2110067-001	EP2110067-002	EP2110067-003	EP2110067-004	EP2110067-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**95.5**	**88.0**	**86.5**	**86.5**	**95.0**
13C8-PFOA	----	0.0002	%		**98.0**	**99.0**	**99.5**	**95.5**	**101**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD409_210831	----	----	----	----
			Sampling date / time	31-Aug-2021 14:42	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2110067-006	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**28.1**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD409_210831	----	----	----	----
				Sampling date / time	31-Aug-2021 14:42	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110067-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**90.0**	----	----	----	----
13C8-PFOA	----	0.0002	%		**95.5**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110067**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27027	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3894078)									
EP2110067-003	0089_SD316_210831	EA055: Moisture Content	----	0.1	%	22.4	20.0	11.5	0% - 20%
EP2110231-004	Anonymous	EA055: Moisture Content	----	0.1	%	7.4	7.6	2.5	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3886518)									
EP2110067-001	0089_SD307_210831	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3886518)									
EP2110067-001	0089_SD307_210831	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3886518)									
EP2110067-001	0089_SD307_210831	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3886518) - continued									
EP2110067-001	0089_SD307_210831	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3886518)									
EP2110067-001	0089_SD307_210831	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3886518)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.2	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3886518)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	79.8	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.2	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.0	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.4	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3886518)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.0	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.1	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.5	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.9	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3886518)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	75.6	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	82.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	82.8	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3886518) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	93.2	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3886518)							
EP2110067-001	0089_SD307_210831	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	80.0	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	82.0	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	83.2	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	82.4	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	80.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	87.2	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3886518)							
EP2110067-001	0089_SD307_210831	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	81.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	81.2	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	89.2	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	93.2	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	89.2	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	92.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	88.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	89.2	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	83.6	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	73.6	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	98.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3886518)							
EP2110067-001	0089_SD307_210831	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	86.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	90.9	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	85.4	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	87.5	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	84.6	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	87.6	63.0	144

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3886518) - continued							
EP2110067-001	0089_SD307_210831	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	86.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3886518)							
EP2110067-001	0089_SD307_210831	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	76.8	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	82.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	89.2	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	100	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110067**	Page	: 1 of 4
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 6
Order number	: DEF19009/730	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
0089_SD307_210831, 0089_SD314_210831, 0089_SD316_210831, 0089_SD405_210831, 0089_SD407_210831, 0089_SD409_210831	**31-Aug-2021**	**----**	----	----	**09-Sep-2021**	14-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD307_210831, 0089_SD314_210831, 0089_SD316_210831, 0089_SD405_210831, 0089_SD407_210831, 0089_SD409_210831	**31-Aug-2021**	**07-Sep-2021**	27-Feb-2022	✓	**07-Sep-2021**	17-Oct-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD307_210831, 0089_SD314_210831, 0089_SD316_210831, 0089_SD405_210831, 0089_SD407_210831, 0089_SD409_210831	**31-Aug-2021**	**07-Sep-2021**	27-Feb-2022	✓	**07-Sep-2021**	17-Oct-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD307_210831, 0089_SD314_210831, 0089_SD316_210831, 0089_SD405_210831, 0089_SD407_210831, 0089_SD409_210831	**31-Aug-2021**	**07-Sep-2021**	27-Feb-2022	✓	**07-Sep-2021**	17-Oct-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD307_210831, 0089_SD314_210831, 0089_SD316_210831, 0089_SD405_210831, 0089_SD407_210831, 0089_SD409_210831	**31-Aug-2021**	**07-Sep-2021**	27-Feb-2022	✓	**07-Sep-2021**	17-Oct-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD307_210831, 0089_SD314_210831, 0089_SD316_210831, 0089_SD405_210831, 0089_SD407_210831, 0089_SD409_210831	**31-Aug-2021**	**07-Sep-2021**	27-Feb-2022	✓	**07-Sep-2021**	17-Oct-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110067**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27027	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 01-Sep-2021 13:15	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 13-Sep-2021	Scheduled Reporting Date	: **13-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 8.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 6 / 6

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2110067-001	31-Aug-2021 12:01	0089_SD307_210831	✓	✓
EP2110067-002	31-Aug-2021 12:03	0089_SD314_210831	✓	✓
EP2110067-003	31-Aug-2021 12:17	0089_SD316_210831	✓	✓
EP2110067-004	31-Aug-2021 13:59	0089_SD405_210831	✓	✓
EP2110067-005	31-Aug-2021 14:22	0089_SD407_210831	✓	✓
EP2110067-006	31-Aug-2021 14:42	0089_SD409_210831	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110067

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno **Project Manager:** [redacted]

ALS Compass COC Reference: 27017, 27018, 27042, 27025, 27027, 27023, 27030, 27056 **# Samples:** **Phone:**

Sampler:

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send 1 esky to Eurofins for trips.

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 31/08/21, 5pm	Date / Time: 1/9/21 1315	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 27027 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD307		31/08/2021 12:01 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
002	0089_SD314		31/08/2021 12:03 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
003	0089_SD316		31/08/2021 12:17 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
004	0089_SD405		31/08/2021 01:59 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
005	0089_SD407		31/08/2021 02:22 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
006	0089_SD409		31/08/2021 02:42 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		

CHAIN OF CUSTODY

ALS COC#: 27027 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SD307	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
002	0089_SD314	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
003	0089_SD316	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
004	0089_SD405	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
005	0089_SD407	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
006	0089_SD409	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 27027 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19
SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD307	HDPE Soil Jar	200 mL	00621019058314	Grey	No	
002	0089_SD314	HDPE Soil Jar	200 mL	00621019058268	Grey	No	
003	0089_SD316	HDPE Soil Jar	200 mL	00621019043018	Grey	No	
004	0089_SD405	HDPE Soil Jar	200 mL	00621019043030	Grey	No	
005	0089_SD407	HDPE Soil Jar	200 mL	00621019043081	Grey	No	
006	0089_SD409	HDPE Soil Jar	200 mL	00621019043026	Grey	No	

Total Bottle Count: ALS: 6, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110068**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021 13:15
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27056	Issue Date	: 13-Sep-2021 11:28
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW319_210831	0089_SW318_210831	0089_SW317_210831	----	----
				Sampling date / time	31-Aug-2021 14:30	31-Aug-2021 14:31	31-Aug-2021 14:33	----	----
Compound	CAS Number	LOR	Unit		EP2110068-001	EP2110068-002	EP2110068-003	--------	--------
					Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		119	122	121	----	----
Total Alkalinity as CaCO3	----	1	mg/L		119	122	121	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2410	2490	2350	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17600	17600	17600	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		420	435	454	----	----
Magnesium	7439-95-4	1	mg/L		1300	1350	1400	----	----
Sodium	7440-23-5	1	mg/L		10100	10400	10900	----	----
Potassium	7440-09-7	1	mg/L		536	551	582	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		549	551	548	----	----
ø Total Cations	----	0.01	meq/L		581	599	627	----	----
ø Ionic Balance	----	0.01	%		2.83	4.22	6.73	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW319_210831	0089_SW318_210831	0089_SW317_210831	----	----
				Sampling date / time	31-Aug-2021 14:30	31-Aug-2021 14:31	31-Aug-2021 14:33	----	----
Compound	CAS Number	LOR	Unit		EP2110068-001	EP2110068-002	EP2110068-003	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW319_210831	0089_SW318_210831	0089_SW317_210831	----	----
				Sampling date / time	31-Aug-2021 14:30	31-Aug-2021 14:31	31-Aug-2021 14:33	----	----
Compound	CAS Number	LOR	Unit		EP2110068-001	EP2110068-002	EP2110068-003	--------	--------
					Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**94.2**	**107**	**101**	----	----
13C8-PFOA	----	0.02	%		**96.9**	**102**	**97.8**	----	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110068**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27056	Issue Date	: 13-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3880387)									
EP2110065-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	116	118	1.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	116	118	1.4	0% - 20%
EP2110068-002	0089_SW318_210831	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	122	121	0.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	122	121	0.9	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3881214)									
EP2110064-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	36	35	0.0	0% - 20%
EP2110065-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2430	2420	0.3	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3881213)									
EP2110064-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	51	51	0.0	0% - 20%
EP2110065-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	17600	17700	0.5	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3880059)									
EP2110068-001	0089_SW319_210831	ED093F: Calcium	7440-70-2	1	mg/L	420	429	2.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1300	1340	2.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10100	10300	2.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	536	552	3.0	0% - 20%
EP2110073-008	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	78	80	3.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	14	14	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	25	25	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3887459)									
EP2110068-001	0089_SW319_210831	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	89.9	92.5	2.9	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.63	0.64	1.9	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	2.45	2.11	14.7	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	26.2	25.1	4.3	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	2.44	2.19	10.5	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3887459)									
EP2110068-001	0089_SW319_210831	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	2.47	2.37	4.0	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.64	1.59	3.5	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	16.1	14.0	13.7	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.58	0.53	8.7	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.4	0.4	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3887459)									
EP2110068-001	0089_SW319_210831	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3887459) - continued									
EP2110068-001	0089_SW319_210831	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3887459)									
EP2110068-001	0089_SW319_210831	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110071-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.08	0.08	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3887459)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 3887459) - continued									
EP2110068-001	0089_SW319_210831	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	143	142	1.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3880387)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	108	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881214)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	93.4	87.7	113
				<1	500 mg/L	97.0	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3881213)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	92.0	87.9	114
				<1	1000 mg/L	101	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3880059)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.3	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.1	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.4	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887459)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	106	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	99.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	103	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	113	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	121	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887459)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	122	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	108	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	100	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	119	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	100	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	101	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	84.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887459)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	128	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	120	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	129	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	100	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881214)							
EP2110064-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	92.8	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3881213)							
EP2110064-004	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	98.3	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	111	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	127	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	113	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	115	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	90.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	99.6	53.0	142

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	100	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	109	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	106	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	105	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	113	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	107	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	99.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	98.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	102	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	132	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	114	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	95.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	92.9	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	102	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	90.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	110	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	86.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	138	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	111	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	84.2	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110068**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 13-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 3
Order number	: DEF19009/730	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_SW319_210831, 0089_SW317_210831	0089_SW318_210831,	**31-Aug-2021**	**----**	----	----	**02-Sep-2021**	14-Sep-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_SW319_210831, 0089_SW317_210831	0089_SW318_210831,	**31-Aug-2021**	**----**	----	----	**13-Sep-2021**	28-Sep-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_SW319_210831, 0089_SW317_210831	0089_SW318_210831,	**31-Aug-2021**	**----**	----	----	**13-Sep-2021**	28-Sep-2021	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_SW319_210831, 0089_SW317_210831	0089_SW318_210831,	**31-Aug-2021**	**----**	----	----	**03-Sep-2021**	07-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_SW319_210831, 0089_SW317_210831	0089_SW318_210831,	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0089_SW319_210831, 0089_SW317_210831	0089_SW318_210831,	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0089_SW319_210831, 0089_SW317_210831	0089_SW318_210831,	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_SW319_210831, 0089_SW317_210831	0089_SW318_210831,	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_SW319_210831, 0089_SW318_210831, 0089_SW317_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110068**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27056	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 01-Sep-2021 13:15	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 13-Sep-2021	Scheduled Reporting Date	: **13-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 8.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110068-001	31-Aug-2021 14:30	0089_SW319_210831	✓	✓	✓	✓
EP2110068-002	31-Aug-2021 14:31	0089_SW318_210831	✓	✓	✓	✓
EP2110068-003	31-Aug-2021 14:33	0089_SW317_210831	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass SAMPLING Intelligence

Environmental Division
Perth
Work Order Reference
EP2110068

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno **Project Manager** [redacted]

ALS Compass COC Reference: 27017, 27018, 27022, 27025, 27027, 27028, 27030, 27056 **# Samples:** _____ **Sampler:** _____

Phone: _____

Turnaround Requirements: Standard ✓ Urgent _____

Special Instructions:

Please send 1 esky to Eurofins for trips.

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 31/08/21, 5pm	Date / Time: 1/9/21 1315	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: **27056** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling SW/PWJS

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SW319	Extra pfas bottles for internal qc (2x)	31/08/2021 02:30 PM	Water	ALS: 6 Non ALS: 0	No	Partial 7/8		
002	0089_SW318		31/08/2021 02:31 PM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8		
003	0089_SW317		31/08/2021 02:33 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: **27056** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling SW/PWJS

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SW319	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_SW318	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_SW317	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

(ALS) COC#: 27056 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling SW/PWJS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SW319	Clear Plastic Bottle - Natural	250 mL	00070220025129	Green	No	
001	0089_SW319	Clear Plastic Bottle - Natural	250 mL	00070220025154	Green	No	
001	0089_SW319	HDPE (no PTFE)	20 mL	00352101017127	Grey	No	
001	0089_SW319	HDPE (no PTFE)	20 mL	00350019151059	Grey	No	
001	0089_SW319	HDPE (no PTFE)	20 mL	00352101020596	Grey	No	
001	0089_SW319	HDPE (no PTFE)	20 mL	00350019150915	Grey	No	
002	0089_SW318	HDPE (no PTFE)	20 mL	00350019150985	Grey	No	
002	0089_SW318	Clear Plastic Bottle - Natural	250 mL	00070220025284	Green	No	
002	0089_SW318	Clear Plastic Bottle - Natural	250 mL	00070220025244	Green	No	
002	0089_SW318	HDPE (no PTFE)	20 mL	00350019151107	Grey	No	
003	0089_SW317	Clear Plastic Bottle - Natural	250 mL	00070520069471	Green	No	
003	0089_SW317	HDPE (no PTFE)	20 mL	00352101020630	Grey	No	
003	0089_SW317	HDPE (no PTFE)	20 mL	00352101017132	Grey	No	

Total Bottle Count: ALS: 13, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110071**	Page	: 1 of 11
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021 13:15
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27017	Issue Date	: 13-Sep-2021 13:29
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW288	0089_MW249_210831	0089_MW139_210831	0089_MW141_210831	0089_MW272_210831
				Sampling date / time	31-Aug-2021 08:58	31-Aug-2021 09:11	31-Aug-2021 09:53	31-Aug-2021 10:09	31-Aug-2021 10:20
Compound	CAS Number	LOR	Unit		EP2110071-004	EP2110071-005	EP2110071-006	EP2110071-007	EP2110071-008
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		272	426	149	466	400
Total Alkalinity as CaCO3	----	1	mg/L		272	426	149	466	400
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		55	64	16	994	1150
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		85	130	41	8060	9960
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		76	119	66	368	371
Magnesium	7439-95-4	1	mg/L		21	40	8	577	720
Sodium	7440-23-5	1	mg/L		69	82	20	4410	5540
Potassium	7440-09-7	1	mg/L		6	3	2	203	252
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		8.98	13.5	4.47	257	313
ø Total Cations	----	0.01	meq/L		8.68	12.9	4.87	263	325
ø Ionic Balance	----	0.01	%		1.71	2.42	4.35	1.06	1.93
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.16	<0.02	<0.02	0.63	0.46
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.24	<0.02	<0.02	2.45	1.51
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.57	0.13	<0.02	26.2	17.4
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		0.03	<0.02	<0.02	2.44	1.89
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		5.30	0.14	<0.01	89.9	68.1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	0.4	0.3
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		0.04	<0.02	<0.02	1.64	1.24
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		0.26	0.02	<0.02	16.1	11.4
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	0.58	0.38

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW288	0089_MW249_210831	0089_MW139_210831	0089_MW141_210831	0089_MW272_210831
				Sampling date / time	31-Aug-2021 08:58	31-Aug-2021 09:11	31-Aug-2021 09:53	31-Aug-2021 10:09	31-Aug-2021 10:20
Compound	CAS Number	LOR	Unit		EP2110071-004	EP2110071-005	EP2110071-006	EP2110071-007	EP2110071-008
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.03**	<0.01	<0.01	**2.47**	**1.77**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	**0.04**	**0.02**
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	**0.08**	**0.05**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW288	0089_MW249_210831	0089_MW139_210831	0089_MW141_210831	0089_MW272_210831
				Sampling date / time	31-Aug-2021 08:58	31-Aug-2021 09:11	31-Aug-2021 09:53	31-Aug-2021 10:09	31-Aug-2021 10:20
Compound	CAS Number	LOR	Unit		EP2110071-004	EP2110071-005	EP2110071-006	EP2110071-007	EP2110071-008
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**6.63**	**0.29**	<0.01	**143**	**104**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**5.87**	**0.27**	<0.01	**116**	**85.5**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**6.36**	**0.29**	<0.01	**138**	**101**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.4**	**103**	**95.7**	**78.0**	**95.8**
13C8-PFOA	----	0.02	%		**94.9**	**97.6**	**99.3**	**102**	**101**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW216_210831	0089_MW228_210831	0089_MW227_210831	0089_MW226_210831	----
				Sampling date / time	31-Aug-2021 10:55	31-Aug-2021 13:43	31-Aug-2021 13:59	31-Aug-2021 14:35	----
Compound	CAS Number	LOR	Unit		EP2110071-009	EP2110071-010	EP2110071-011	EP2110071-012	--------
					Result	Result	Result	Result	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**313**	**606**	**360**	**666**	----
Total Alkalinity as CaCO3	----	1	mg/L		**313**	**606**	**360**	**666**	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**68**	**1010**	**217**	**2090**	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**407**	**6910**	**940**	**14200**	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**128**	**215**	**142**	**388**	----
Magnesium	7439-95-4	1	mg/L		**38**	**536**	**83**	**1080**	----
Sodium	7440-23-5	1	mg/L		**158**	**4170**	**450**	**7860**	----
Potassium	7440-09-7	1	mg/L		**7**	**202**	**40**	**450**	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**19.2**	**228**	**38.2**	**457**	----
ø Total Cations	----	0.01	meq/L		**16.6**	**241**	**34.5**	**462**	----
ø Ionic Balance	----	0.01	%		**7.23**	**2.84**	**5.10**	**0.46**	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.39**	**0.22**	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.50**	**0.15**	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**3.45**	**0.13**	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.16**	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**1.04**	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**1.0**	**2.3**	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**3.61**	**10.4**	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**1.98**	**10.4**	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.32**	**2.55**	<0.02	<0.02	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW216_210831	0089_MW228_210831	0089_MW227_210831	0089_MW226_210831	----
				Sampling date / time	31-Aug-2021 10:55	31-Aug-2021 13:43	31-Aug-2021 13:59	31-Aug-2021 14:35	----
Compound	CAS Number	LOR	Unit		EP2110071-009	EP2110071-010	EP2110071-011	EP2110071-012	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.30**	**0.03**	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**2.71**	**0.40**	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW216_210831	0089_MW228_210831	0089_MW227_210831	0089_MW226_210831	----
				Sampling date / time	31-Aug-2021 10:55	31-Aug-2021 13:43	31-Aug-2021 13:59	31-Aug-2021 14:35	----
Compound	CAS Number	LOR	Unit		EP2110071-009	EP2110071-010	EP2110071-011	EP2110071-012	--------
					Result	Result	Result	Result	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**15.5**	**26.6**	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**4.49**	**0.13**	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**14.8**	**26.4**	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.9**	**96.9**	**104**	**101**	----
13C8-PFOA	----	0.02	%		**98.0**	**97.9**	**97.2**	**98.9**	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0089_QC301	0089_QC302	0089_QC303	----	----
				Sampling date / time	31-Aug-2021 08:04	31-Aug-2021 08:05	31-Aug-2021 08:07	----	----
Compound	CAS Number	LOR	Unit		EP2110071-001	EP2110071-002	EP2110071-003	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0089_QC301	0089_QC302	0089_QC303	----	----
				Sampling date / time	31-Aug-2021 08:04	31-Aug-2021 08:05	31-Aug-2021 08:07	----	----
Compound	CAS Number	LOR	Unit		EP2110071-001	EP2110071-002	EP2110071-003	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.1**	**99.4**	**110**	----	----
13C8-PFOA	----	0.02	%		**96.1**	**96.3**	**97.6**	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **RINSATE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110071**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27017	Issue Date	: 13-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3880387)									
EP2110065-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	116	118	1.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	116	118	1.4	0% - 20%
EP2110068-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	122	121	0.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	122	121	0.9	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3880388)									
EP2110071-012	0089_MW226_210831	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	666	662	0.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	666	662	0.6	0% - 20%
EP2110073-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	111	112	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	111	112	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3881216)									
EP2110071-004	0089_MW288	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	55	56	2.5	0% - 20%
EP2110073-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	8	8	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3881215)									
EP2110071-004	0089_MW288	ED045G: Chloride	16887-00-6	1	mg/L	85	85	0.0	0% - 20%
EP2110073-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	38	40	3.7	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3882705)									
EP2110065-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	400	416	3.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1300	1350	3.9	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10100	10500	3.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	517	536	3.7	0% - 20%
EP2110065-012	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	412	416	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1310	1340	1.9	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10200	10300	1.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	522	530	1.6	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110071-007	0089_MW141_210831	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	89.9	92.5	2.9	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.63	0.64	1.9	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	2.45	2.11	14.7	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	26.2	25.1	4.3	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	2.44	2.19	10.5	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110071-007	0089_MW141_210831	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	2.47	2.37	4.0	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.64	1.59	3.5	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	16.1	14.0	13.7	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.58	0.53	8.7	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3887459) - continued									
EP2110071-007	0089_MW141_210831	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.4	0.4	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110071-007	0089_MW141_210831	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3887459) - continued									
EP2110071-007	0089_MW141_210831	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.08	0.08	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110071-007	0089_MW141_210831	EP231X: Sum of PFAS	----	0.01	µg/L	143	142	1.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3880387)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	108	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3880388)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	101	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881216)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.8	87.7	113
				<1	500 mg/L	95.4	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3881215)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	95.8	87.9	114
				<1	1000 mg/L	101	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3882705)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	92.2	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	93.7	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	91.0	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.5	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887459)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	106	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	99.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	103	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459) - continued								
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	113	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	121	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887459)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	122	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	108	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	100	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	119	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	100	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	101	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	84.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887459)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	128	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	120	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	129	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	100	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881216)							
EP2110071-004	0089_MW288	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	98.0	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3881215)							
EP2110071-004	0089_MW288	ED045G: Chloride	16887-00-6	1000 mg/L	99.3	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887459)							
EP2110071-005	0089_MW249_210831	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	111	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	127	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	113	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	115	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	90.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	99.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459)							
EP2110071-005	0089_MW249_210831	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	100	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	109	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	106	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	105	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	113	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	107	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	99.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	98.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	102	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	132	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887459)							
EP2110071-005	0089_MW249_210831	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	114	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	95.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	92.9	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	102	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	90.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	110	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	86.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887459)							
EP2110071-005	0089_MW249_210831	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	138	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	111	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	84.2	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110071**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 13-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 12
Order number	: DEF19009/730	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW288, 0089_MW249_210831, 0089_MW139_210831, 0089_MW141_210831, 0089_MW272_210831, 0089_MW216_210831, 0089_MW228_210831, 0089_MW227_210831, 0089_MW226_210831	**31-Aug-2021**	**----**	----	----	**02-Sep-2021**	14-Sep-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW288, 0089_MW249_210831, 0089_MW139_210831, 0089_MW141_210831, 0089_MW272_210831, 0089_MW216_210831, 0089_MW228_210831, 0089_MW227_210831, 0089_MW226_210831	**31-Aug-2021**	**----**	----	----	**13-Sep-2021**	28-Sep-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW288, 0089_MW249_210831, 0089_MW139_210831, 0089_MW141_210831, 0089_MW272_210831, 0089_MW216_210831, 0089_MW228_210831, 0089_MW227_210831, 0089_MW226_210831	**31-Aug-2021**	**----**	----	----	**13-Sep-2021**	28-Sep-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW288, 0089_MW249_210831, 0089_MW139_210831, 0089_MW141_210831, 0089_MW272_210831, 0089_MW216_210831, 0089_MW228_210831, 0089_MW227_210831, 0089_MW226_210831	**31-Aug-2021**	**----**	----	----	**03-Sep-2021**	07-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_QC301, 0089_QC302, 0089_QC303, 0089_MW288, 0089_MW249_210831, 0089_MW139_210831, 0089_MW141_210831, 0089_MW272_210831, 0089_MW216_210831, 0089_MW228_210831, 0089_MW227_210831, 0089_MW226_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_QC301, 0089_QC302, 0089_QC303, 0089_MW288, 0089_MW249_210831, 0089_MW139_210831, 0089_MW141_210831, 0089_MW272_210831, 0089_MW216_210831, 0089_MW228_210831, 0089_MW227_210831, 0089_MW226_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_QC301, 0089_QC302, 0089_QC303, 0089_MW288, 0089_MW249_210831, 0089_MW139_210831, 0089_MW141_210831, 0089_MW272_210831, 0089_MW216_210831, 0089_MW228_210831, 0089_MW227_210831, 0089_MW226_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_QC301, 0089_QC302, 0089_QC303, 0089_MW288, 0089_MW249_210831, 0089_MW139_210831, 0089_MW141_210831, 0089_MW272_210831, 0089_MW216_210831, 0089_MW228_210831, 0089_MW227_210831, 0089_MW226_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_QC301, 0089_QC302, 0089_QC303, 0089_MW288, 0089_MW249_210831, 0089_MW139_210831, 0089_MW141_210831, 0089_MW272_210831, 0089_MW216_210831, 0089_MW228_210831, 0089_MW227_210831, 0089_MW226_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110071**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27017	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 01-Sep-2021 13:15	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 13-Sep-2021	Scheduled Reporting Date	: **13-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 8.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110071-001	31-Aug-2021 08:04	0089_QC301		✓		
EP2110071-002	31-Aug-2021 08:05	0089_QC302		✓		
EP2110071-003	31-Aug-2021 08:07	0089_QC303		✓		
EP2110071-004	31-Aug-2021 08:58	0089_MW288	✓	✓	✓	✓
EP2110071-005	31-Aug-2021 09:11	0089_MW249_210831	✓	✓	✓	✓
EP2110071-006	31-Aug-2021 09:53	0089_MW139_210831	✓	✓	✓	✓
EP2110071-007	31-Aug-2021 10:09	0089_MW141_210831	✓	✓	✓	✓
EP2110071-008	31-Aug-2021 10:20	0089_MW272_210831	✓	✓	✓	✓
EP2110071-009	31-Aug-2021 10:55	0089_MW216_210831	✓	✓	✓	✓
EP2110071-010	31-Aug-2021 13:43	0089_MW228_210831	✓	✓	✓	✓
EP2110071-011	31-Aug-2021 13:59	0089_MW227_210831	✓	✓	✓	✓
EP2110071-012	31-Aug-2021 14:35	0089_MW226_210831	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass SAMPLING Intelligence

Environmental Division Perth
Work Order Reference
EP2110071

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno **Project Manage** [redacted]

ALS Compass COC Reference: 27017, 27018, 27042, 27025, 27027, 27023, 27030, 27056 **# Samples:** **Phone:**

Sampler: **Phone:**

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send 1 esky to Eurofins for trips.

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time:	**Date / Time:**	**Date / Time:**	**Date / Time:**
31/08/21, 5pm	1/9/21 1315		

CHAIN OF CUSTODY

(ALS) COC#: **27017** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_QC301		31/08/2021 08:04 AM	Water	ALS: 2 Non ALS: 0	No		X		
002	0089_QC302		31/08/2021 08:05 AM	Water	ALS: 2 Non ALS: 0	No		X		
003	0089_QC303		31/08/2021 08:07 AM	Water	ALS: 2 Non ALS: 0	No		X		
004	0089_MW288		31/08/2021 08:58 AM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8			
005	0089_MW249		31/08/2021 09:11 AM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8			Extra PFAS lab QAQC samples collected
006	0089_MW139		31/08/2021 09:53 AM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8			
007	0089_MW141		31/08/2021 10:09 AM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8			Extra PFAS lab QAQC samples collected
008	0089_MW272		31/08/2021 10:20 AM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8			
009	0089_MW216		31/08/2021 10:55 AM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8			Extra PFAS lab QAQC samples collected

CHAIN OF CUSTODY

COC#: **27017** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW228		31/08/2021 01:43 PM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8			Extra PFAS lab QAQC samples collected
011	0089_MW227		31/08/2021 01:59 PM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8			
012	0089_MW226		31/08/2021 02:35 PM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8			

CHAIN OF CUSTODY

COC#: **27017** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
004	0089_MW288	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW249	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0089_MW139	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW141	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW272	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_MW216	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_MW228	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_MW227	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
012	0089_MW226	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 27017 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_QC301	HDPE (no PTFE)	20 mL	00350019047458	Grey	No	
001	0089_QC301	HDPE (no PTFE)	20 mL	00350019047378	Grey	No	
002	0089_QC302	HDPE (no PTFE)	20 mL	00350019047383	Grey	No	
002	0089_QC302	HDPE (no PTFE)	20 mL	00350019047350	Grey	No	
003	0089_QC303	HDPE (no PTFE)	20 mL	00350019047441	Grey	No	
003	0089_QC303	HDPE (no PTFE)	20 mL	00350019047463	Grey	No	
004	0089_MW288	HDPE (no PTFE)	20 mL	00350019151048	Grey	No	
004	0089_MW288	HDPE (no PTFE)	20 mL	00350019151019	Grey	No	
004	0089_MW288	Clear Plastic Bottle - Natural	250 mL	00070220025045	Green	No	
004	0089_MW288	Clear Plastic Bottle - Natural	250 mL	00070220025196	Green	No	
005	0089_MW249	HDPE (no PTFE)	20 mL	00352101016894	Grey	No	
005	0089_MW249	HDPE (no PTFE)	20 mL	00352101016923	Grey	No	
005	0089_MW249	HDPE (no PTFE)	20 mL	00350019151014	Grey	No	
005	0089_MW249	HDPE (no PTFE)	20 mL	00350019150797	Grey	No	
005	0089_MW249	Clear Plastic Bottle - Natural	250 mL	00070220025400	Green	No	
005	0089_MW249	Clear Plastic Bottle - Natural	250 mL	00070220025451	Green	No	
006	0089_MW139	HDPE (no PTFE)	20 mL	00350019151145	Grey	No	
006	0089_MW139	Clear Plastic Bottle - Natural	250 mL	00070220025134	Green	No	
006	0089_MW139	Clear Plastic Bottle - Natural	250 mL	00070220025093	Green	No	
006	0089_MW139	HDPE (no PTFE)	20 mL	00350019150960	Grey	No	
007	0089_MW141	HDPE (no PTFE)	20 mL	00350019150872	Grey	No	
007	0089_MW141	HDPE (no PTFE)	20 mL	00352101020543	Grey	No	
007	0089_MW141	HDPE (no PTFE)	20 mL	00352101017271	Grey	No	
007	0089_MW141	HDPE (no PTFE)	20 mL	00350019151055	Grey	No	
007	0089_MW141	Clear Plastic Bottle - Natural	250 mL	00070220025484	Green	No	
007	0089_MW141	Clear Plastic Bottle - Natural	250 mL	00070220025314	Green	No	

CHAIN OF CUSTODY

COC#: **27017** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

008	0089_MW272	HDPE (no PTFE)	20 mL	00350019150939	Grey	No	
008	0089_MW272	HDPE (no PTFE)	20 mL	00350019151352	Grey	No	
008	0089_MW272	Clear Plastic Bottle - Natural	250 mL	00070220025053	Green	No	
008	0089_MW272	Clear Plastic Bottle - Natural	250 mL	00070220024895	Green	No	
009	0089_MW216	HDPE (no PTFE)	20 mL	00352101016972	Grey	No	
009	0089_MW216	HDPE (no PTFE)	20 mL	00352101017093	Grey	No	
009	0089_MW216	HDPE (no PTFE)	20 mL	00350019151040	Grey	No	
009	0089_MW216	HDPE (no PTFE)	20 mL	00350019150913	Grey	No	
009	0089_MW216	Clear Plastic Bottle - Natural	250 mL	00070220025181	Green	No	
009	0089_MW216	Clear Plastic Bottle - Natural	250 mL	00070220025272	Green	No	
010	0089_MW228	Clear Plastic Bottle - Natural	250 mL	00070220025310	Green	No	
010	0089_MW228	HDPE (no PTFE)	20 mL	00352101020551	Grey	No	
010	0089_MW228	HDPE (no PTFE)	20 mL	00350019150854	Grey	No	
010	0089_MW228	HDPE (no PTFE)	20 mL	00352101016956	Grey	No	
010	0089_MW228	HDPE (no PTFE)	20 mL	00352101017222	Grey	No	
010	0089_MW228	Clear Plastic Bottle - Natural	250 mL	00070220025336	Green	No	
011	0089_MW227	HDPE (no PTFE)	20 mL	00350019150813	Grey	No	
011	0089_MW227	HDPE (no PTFE)	20 mL	00350019151159	Grey	No	
011	0089_MW227	Clear Plastic Bottle - Natural	250 mL	00070220024907	Green	No	
011	0089_MW227	Clear Plastic Bottle - Natural	250 mL	00070220025141	Green	No	
012	0089_MW226	Clear Plastic Bottle - Natural	250 mL	00070220025197	Green	No	
012	0089_MW226	Clear Plastic Bottle - Natural	250 mL	00070220025368	Green	No	
012	0089_MW226	HDPE (no PTFE)	20 mL	00350019151017	Grey	No	
012	0089_MW226	HDPE (no PTFE)	20 mL	00350019150792	Grey	No	

Total Bottle Count: ALS: 50, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110072**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +[redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021 13:15
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27018	Issue Date	: 10-Sep-2021 08:15
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW311_210831	0089_SW408_210831	----	----	----
				Sampling date / time	31-Aug-2021 12:15	31-Aug-2021 14:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2110072-004	EP2110072-006	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**117**	**126**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**117**	**126**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2390**	**2510**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**17600**	**17700**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**430**	**478**	----	----	----
Magnesium	7439-95-4	1	mg/L		**1380**	**1490**	----	----	----
Sodium	7440-23-5	1	mg/L		**10800**	**11500**	----	----	----
Potassium	7440-09-7	1	mg/L		**559**	**600**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**548**	**554**	----	----	----
ø Total Cations	----	0.01	meq/L		**619**	**662**	----	----	----
ø Ionic Balance	----	0.01	%		**6.04**	**8.88**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.03**	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.03**	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW311_210831	0089_SW408_210831	----	----	----
				Sampling date / time	31-Aug-2021 12:15	31-Aug-2021 14:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2110072-004	EP2110072-006	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW311_210831	0089_SW408_210831	----	----	----
				Sampling date / time	31-Aug-2021 12:15	31-Aug-2021 14:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2110072-004	EP2110072-006	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.06**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.06**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**100**	**97.0**	----	----	----
13C8-PFOA	----	0.02	%		**101**	**96.9**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	0089_PW306_210831	0089_PW315_210831	0089_QC116_210831	0089_PW308_210831	----
			Sampling date / time	31-Aug-2021 11:34	31-Aug-2021 11:55	31-Aug-2021 11:56	31-Aug-2021 12:39	----
Compound	CAS Number	LOR	Unit	EP2110072-001	EP2110072-002	EP2110072-003	EP2110072-005	--------
				Result	Result	Result	Result	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**119**	**120**	**120**	**127**	----
Total Alkalinity as CaCO3	----	1	mg/L	**119**	**120**	**120**	**127**	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**2510**	**2440**	**2440**	**2520**	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**17700**	**17700**	**17900**	**18000**	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**452**	**471**	**490**	**486**	----
Magnesium	7439-95-4	1	mg/L	**1410**	**1490**	**1540**	**1540**	----
Sodium	7440-23-5	1	mg/L	**10900**	**11500**	**11800**	**11900**	----
Potassium	7440-09-7	1	mg/L	**563**	**600**	**622**	**625**	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**554**	**552**	**558**	**563**	----
ø Total Cations	----	0.01	meq/L	**627**	**662**	**680**	**685**	----
ø Ionic Balance	----	0.01	%	**6.20**	**8.99**	**9.87**	**9.77**	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	**0.01**	**0.01**	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW306_210831	0089_PW315_210831	0089_QC116_210831	0089_PW308_210831	----
				Sampling date / time	31-Aug-2021 11:34	31-Aug-2021 11:55	31-Aug-2021 11:56	31-Aug-2021 12:39	----
Compound	CAS Number	LOR	Unit		EP2110072-001	EP2110072-002	EP2110072-003	EP2110072-005	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW306_210831	0089_PW315_210831	0089_QC116_210831	0089_PW308_210831	----
				Sampling date / time	31-Aug-2021 11:34	31-Aug-2021 11:55	31-Aug-2021 11:56	31-Aug-2021 12:39	----
Compound	CAS Number	LOR	Unit		EP2110072-001	EP2110072-002	EP2110072-003	EP2110072-005	--------
					Result	Result	Result	Result	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.01**	**0.01**	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.01**	**0.01**	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.01**	**0.01**	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**99.9**	**101**	**106**	----
13C8-PFOA	----	0.02	%		**102**	**98.3**	**99.0**	**99.1**	----

Surrogate Control Limits

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110072**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	[redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27018	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3880388)									
EP2110071-012	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	666	662	0.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	666	662	0.6	0% - 20%
EP2110073-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	111	112	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	111	112	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3881206)									
EP2110021-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2420	2450	1.4	0% - 20%
EP2110072-005	0089_PW308_210831	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2520	2500	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3881205)									
EP2110021-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	17100	17300	1.1	0% - 20%
EP2110072-005	0089_PW308_210831	ED045G: Chloride	16887-00-6	1	mg/L	18000	18000	0.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3882708)									
EP2110072-001	0089_PW306_210831	ED093F: Calcium	7440-70-2	1	mg/L	452	474	4.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1410	1490	5.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10900	11500	5.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	563	606	7.3	0% - 20%
EP2110205-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	426	425	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	182	177	2.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	145	141	2.9	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	89.9	92.5	2.9	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.63	0.64	1.9	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	2.45	2.11	14.7	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	26.2	25.1	4.3	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	2.44	2.19	10.5	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3888171)									
EP2110072-004	0089_SW311_210831	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110073-011	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.44	0.43	3.4	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.10	0.10	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	2.47	2.37	4.0	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.64	1.59	3.5	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	16.1	14.0	13.7	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3887459) - continued									
EP2110071-007	Anonymous	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.58	0.53	8.7	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.4	0.4	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3888171)									
EP2110072-004	0089_SW311_210831	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110073-011	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3887459) - continued									
EP2110068-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3888171)									
EP2110072-004	0089_SW311_210831	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110073-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3888171) - continued									
EP2110073-011	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3887459)									
EP2110068-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110071-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.08	0.08	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3888171)									
EP2110072-004	0089_SW311_210831	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110073-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3887459)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 3887459) - continued									
EP2110068-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110071-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	143	142	1.0	0% - 20%
EP231P: PFAS Sums (QC Lot: 3888171)									
EP2110072-004	0089_SW311_210831	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110073-011	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.54	0.53	1.9	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3880388)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	101	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881206)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	108	87.7	113
				<1	500 mg/L	105	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3881205)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.3	87.9	114
				<1	1000 mg/L	104	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3882708)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.2	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887459)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	106	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	99.6	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3888171)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	107	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	93.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	92.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	88.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	103	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459) - continued								
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	113	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	121	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3888171)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	83.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	89.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	85.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	87.0	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	95.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	86.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	83.2	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	76.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	81.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	83.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	95.4	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887459)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	122	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	108	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	100	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	119	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	100	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	101	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	84.8	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3888171)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	86.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	72.3	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	70.8	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	81.0	66.0	145

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3888171) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	79.1	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	83.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	74.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887459)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	128	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	120	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	129	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	100	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3888171)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	96.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	90.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	94.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	89.0	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881206)							
EP2110021-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3881205)							
EP2110021-007	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	111	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	127	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	113	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	115	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	90.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	99.6	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3888171)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3888171) - continued							
EP2110073-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	87.6	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	98.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	106	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	103	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	82.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	100	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	109	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	106	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	105	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	113	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	107	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	99.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	98.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	102	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	132	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3888171)							
EP2110073-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	89.6	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	95.2	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	91.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	96.4	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	102	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	92.0	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	89.2	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	91.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	86.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	90.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	106	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	114	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	95.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	92.9	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	102	66.0	145

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3887459) - continued							
EP2110071-005	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	90.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	110	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	86.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3888171)							
EP2110073-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	98.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	69.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	74.2	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	103	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	93.5	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	87.8	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	82.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3887459)							
EP2110071-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	138	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	111	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	84.2	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3888171)							
EP2110073-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	102	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	103	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	108	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	95.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110072**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 10-Sep-2021
Sampler	: [redacted]	No. of samples received	: 6
Order number	: DEF19009/730	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2110021--007	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2110021--007	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_PW306_210831,	0089_PW315_210831,	**31-Aug-2021**	**----**	----	----	**02-Sep-2021**	14-Sep-2021	✓
0089_QC116_210831,	0089_SW311_210831,							
0089_PW308_210831,	0089_SW408_210831							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_PW306_210831,	0089_PW315_210831,	**31-Aug-2021**	**----**	----	----	**08-Sep-2021**	28-Sep-2021	✓
0089_QC116_210831,	0089_SW311_210831,							
0089_PW308_210831,	0089_SW408_210831							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_PW306_210831,	0089_PW315_210831,	**31-Aug-2021**	**----**	----	----	**08-Sep-2021**	28-Sep-2021	✓
0089_QC116_210831,	0089_SW311_210831,							
0089_PW308_210831,	0089_SW408_210831							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_PW306_210831,	0089_PW315_210831,	**31-Aug-2021**	**----**	----	----	**03-Sep-2021**	07-Sep-2021	✓
0089_QC116_210831,	0089_SW311_210831,							
0089_PW308_210831,	0089_SW408_210831							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW306_210831, 0089_PW315_210831, 0089_QC116_210831, 0089_SW311_210831, 0089_PW308_210831, 0089_SW408_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW306_210831, 0089_PW315_210831, 0089_QC116_210831, 0089_SW311_210831, 0089_PW308_210831, 0089_SW408_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW306_210831, 0089_PW315_210831, 0089_QC116_210831, 0089_SW311_210831, 0089_PW308_210831, 0089_SW408_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW306_210831, 0089_PW315_210831, 0089_QC116_210831, 0089_SW311_210831, 0089_PW308_210831, 0089_SW408_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW306_210831, 0089_PW315_210831, 0089_QC116_210831, 0089_SW311_210831, 0089_PW308_210831, 0089_SW408_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110072**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27018	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 01-Sep-2021 13:15	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 13-Sep-2021	Scheduled Reporting Date	: **13-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 8.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 6 / 6

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110072-001	31-Aug-2021 11:34	0089_PW306_210831	✓	✓	✓	✓
EP2110072-002	31-Aug-2021 11:55	0089_PW315_210831	✓	✓	✓	✓
EP2110072-003	31-Aug-2021 11:56	0089_QC116_210831	✓	✓	✓	✓
EP2110072-004	31-Aug-2021 12:15	0089_SW311_210831	✓	✓	✓	✓
EP2110072-005	31-Aug-2021 12:39	0089_PW308_210831	✓	✓	✓	✓
EP2110072-006	31-Aug-2021 14:08	0089_SW408_210831	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110072

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno **Project Mana** [redacted]

Phone:

ALS Compass COC Reference: 27017, 27018, 27042, 27025, 27027, 27023, 27030, 27056 **# Samples:**

Sampler:

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send 1 esky to Eurofins for trips.

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 31/08/21, 5pm	Date / Time: 1/9/21 1315	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 27018 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW306		31/08/2021 11:34 AM	Water	ALS: 3 Non ALS: 0	No	Partial 7/8		
002	0089_PW315		31/08/2021 11:55 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC samples collected
003	0089_QC116		31/08/2021 11:56 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0089_SW311		31/08/2021 12:15 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC samples collected
005	0089_PW308		31/08/2021 12:39 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0089_SW408		31/08/2021 02:08 PM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

COC#: 27018 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW306	Surface Waters WATER	Water	- EA005P pH (PCT) - NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA025H Suspended Solids - Standard Level - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_PW315	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_QC116	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW311	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_PW308	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0089_SW408	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 27018 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW306	HDPE (no PTFE)	20 mL	00350019151392	Grey	No	
001	0089_PW306	HDPE (no PTFE)	20 mL	00350019151639	Grey	No	
001	0089_PW306	Clear Plastic Bottle - Natural	250 mL	00071018014868	Green	No	
002	0089_PW315	HDPE (no PTFE)	20 mL	00350019130818	Grey	No	
002	0089_PW315	HDPE (no PTFE)	20 mL	00350019102622	Grey	No	
002	0089_PW315	HDPE (no PTFE)	20 mL	00352010011094	Grey	No	
002	0089_PW315	Clear Plastic Bottle - Natural	20 mL	00352010011173	Grey	No	
003	0089_QC116	Clear Plastic Bottle - Natural	250 mL	00070520069623	Green	No	
003	0089_QC116	HDPE (no PTFE)	250 mL	00070520069519	Green	No	
003	0089_QC116	HDPE (no PTFE)	20 mL	00352010011328	Grey	No	
004	0089_SW311	Clear Plastic Bottle - Natural	20 mL	00352010011056	Grey	No	
004	0089_SW311	HDPE (no PTFE)	250 mL	00070520069618	Green	No	
004	0089_SW311	HDPE (no PTFE)	20 mL	00352010011346	Grey	No	
004	0089_SW311	HDPE (no PTFE)	20 mL	00352010011337	Grey	No	
005	0089_PW308	HDPE (no PTFE)	20 mL	00352101016917	Grey	No	
005	0089_PW308	Clear Plastic Bottle - Natural	20 mL	00352101020627	Grey	No	
005	0089_PW308	HDPE (no PTFE)	250 mL	00070520069520	Green	No	
006	0089_SW408	HDPE (no PTFE)	20 mL	00352101020581	Grey	No	
006	0089_SW408	HDPE (no PTFE)	20 mL	00352101017149	Grey	No	
006	0089_SW408	HDPE (no PTFE)	20 mL	00350019150975	Grey	No	
006	0089_SW408	Clear Plastic Bottle - Natural	20 mL	00350019150862	Grey	No	
		Clear Plastic Bottle - Natural	250 mL	00070220025047	Green	No	
			250 mL	00070220025152	Green	No	

Total Bottle Count: ALS: 23, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110073**	Page	: 1 of 15
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021 13:15
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27030	Issue Date	: 13-Sep-2021 21:46
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 17		
No. of samples analysed	: 17		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic Balance out of acceptable limits for sample #7 and 10 due to analytes not quantified in this report. Both samples contain high concentration of nitrate.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW236_210831	0089_MW259_210831	0089_MW255_210831	0089_MW257_210831	0089_MW243_210831
				Sampling date / time	31-Aug-2021 08:51	31-Aug-2021 09:04	31-Aug-2021 09:34	31-Aug-2021 09:56	31-Aug-2021 10:18
Compound	CAS Number	LOR	Unit		EP2110073-001	EP2110073-002	EP2110073-003	EP2110073-004	EP2110073-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**244**	**207**	**382**	**111**	**252**
Total Alkalinity as CaCO3	----	1	mg/L		**244**	**207**	**382**	**111**	**252**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**33**	**8**	**38**	**10**	**37**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**58**	**38**	**79**	**29**	**55**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**105**	**70**	**106**	**41**	**112**
Magnesium	7439-95-4	1	mg/L		**19**	**11**	**27**	**4**	**15**
Sodium	7440-23-5	1	mg/L		**36**	**25**	**61**	**18**	**33**
Potassium	7440-09-7	1	mg/L		**2**	**2**	**3**	**3**	**6**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**7.20**	**5.37**	**10.6**	**3.24**	**7.36**
ø Total Cations	----	0.01	meq/L		**8.42**	**5.54**	**10.2**	**3.23**	**8.41**
ø Ionic Balance	----	0.01	%		**7.82**	**1.49**	**1.96**	**0.14**	**6.69**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.46**	<0.02	**0.12**	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**2.64**	<0.02	**0.47**	**0.03**	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**34.8**	**0.02**	**6.89**	**0.90**	**0.10**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.49**	<0.02	**0.02**	**0.10**	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**26.0**	**0.12**	**0.90**	**0.08**	**0.43**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**0.1**	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.22**	**0.08**	**0.08**	**0.03**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**1.67**	**0.07**	**0.44**	**0.06**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.90**	<0.02	**0.19**	**0.02**	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW236_210831	0089_MW259_210831	0089_MW255_210831	0089_MW257_210831	0089_MW243_210831
				Sampling date / time	31-Aug-2021 08:51	31-Aug-2021 09:04	31-Aug-2021 09:34	31-Aug-2021 09:56	31-Aug-2021 10:18
Compound	CAS Number	LOR	Unit		EP2110073-001	EP2110073-002	EP2110073-003	EP2110073-004	EP2110073-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**1.74**	<0.01	**0.03**	**0.12**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**2.09**	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW236_210831	0089_MW259_210831	0089_MW255_210831	0089_MW257_210831	0089_MW243_210831
				Sampling date / time	31-Aug-2021 08:51	31-Aug-2021 09:04	31-Aug-2021 09:34	31-Aug-2021 09:56	31-Aug-2021 10:18
					EP2110073-001	EP2110073-002	EP2110073-003	EP2110073-004	EP2110073-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**71.1**	**0.29**	**9.14**	**1.34**	**0.53**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**60.8**	**0.14**	**7.79**	**0.98**	**0.53**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**65.9**	**0.29**	**8.65**	**1.21**	**0.53**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.6**	**93.5**	**104**	**106**	**90.8**
13C8-PFOA	----	0.02	%		**101**	**101**	**98.1**	**102**	**97.6**

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW240_210831	0089_MW238_210831	0089_MW239_210831	0089_MW245_210831	0089_MW242_210831
				Sampling date / time	31-Aug-2021 10:35	31-Aug-2021 10:48	31-Aug-2021 10:54	31-Aug-2021 11:05	31-Aug-2021 11:47
					EP2110073-006	EP2110073-007	EP2110073-008	EP2110073-009	EP2110073-010
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**263**	**180**	**199**	**315**	**210**
Total Alkalinity as CaCO3	----	1	mg/L		**263**	**180**	**199**	**315**	**210**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**43**	**25**	**42**	**16**	**50**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**54**	**47**	**34**	**33**	**87**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**122**	**88**	**78**	**118**	**97**
Magnesium	7439-95-4	1	mg/L		**12**	**14**	**14**	**14**	**22**
Sodium	7440-23-5	1	mg/L		**32**	**27**	**25**	**22**	**59**
Potassium	7440-09-7	1	mg/L		**4**	**2**	**3**	**2**	**5**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**7.67**	**5.44**	**5.81**	**7.56**	**7.69**
ø Total Cations	----	0.01	meq/L		**8.57**	**6.77**	**6.21**	**8.05**	**9.34**
ø Ionic Balance	----	0.01	%		**5.52**	**10.9**	**3.32**	**3.14**	**9.71**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.02**	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.27**	<0.02	**0.03**	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**4.21**	<0.02	<0.02	**0.03**	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.06**	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.07**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.03**	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.25**	<0.02	**0.03**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.06**	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW240_210831	0089_MW238_210831	0089_MW239_210831	0089_MW245_210831	0089_MW242_210831
				Sampling date / time	31-Aug-2021 10:35	31-Aug-2021 10:48	31-Aug-2021 10:54	31-Aug-2021 11:05	31-Aug-2021 11:47
					EP2110073-006	EP2110073-007	EP2110073-008	EP2110073-009	EP2110073-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.13**	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_MW240_210831	0089_MW238_210831	0089_MW239_210831	0089_MW245_210831	0089_MW242_210831
				Sampling date / time	31-Aug-2021 10:35	31-Aug-2021 10:48	31-Aug-2021 10:54	31-Aug-2021 11:05	31-Aug-2021 11:47
					EP2110073-006	EP2110073-007	EP2110073-008	EP2110073-009	EP2110073-010
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**5.03**	<0.01	**0.06**	**0.10**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**4.21**	<0.01	<0.01	**0.10**	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**4.70**	<0.01	**0.03**	**0.10**	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**99.2**	**98.1**	**107**	**97.8**
13C8-PFOA	----	0.02	%		**102**	**97.6**	**100**	**94.3**	**104**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	00089_MW264_210831	0089_MW261_210831	0089_MW010_210831	0089_MW518_210831	0089_MW516_210831
				Sampling date / time	31-Aug-2021 12:03	31-Aug-2021 12:19	31-Aug-2021 12:21	31-Aug-2021 12:50	31-Aug-2021 13:10
Compound	CAS Number	LOR	Unit		EP2110073-011	EP2110073-012	EP2110073-013	EP2110073-014	EP2110073-015
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**310**	**422**	**474**	**387**	**522**
Total Alkalinity as CaCO3	----	1	mg/L		**310**	**422**	**474**	**387**	**522**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**51**	**115**	**163**	**148**	**168**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**567**	**502**	**961**	**325**	**356**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**122**	**134**	**86**	**123**	**225**
Magnesium	7439-95-4	1	mg/L		**45**	**42**	**87**	**61**	**58**
Sodium	7440-23-5	1	mg/L		**248**	**263**	**580**	**171**	**180**
Potassium	7440-09-7	1	mg/L		**11**	**22**	**41**	**18**	**23**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**23.2**	**25.0**	**40.0**	**20.0**	**24.0**
ø Total Cations	----	0.01	meq/L		**20.9**	**22.1**	**37.7**	**19.0**	**24.4**
ø Ionic Balance	----	0.01	%		**5.42**	**6.03**	**2.89**	**2.37**	**0.93**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.15**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.12**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**0.10**	**0.13**	**0.03**	<0.02	**1.42**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.09**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.44**	<0.01	**0.03**	<0.01	**4.80**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.06**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	00089_MW264_210831	0089_MW261_210831	0089_MW010_210831	0089_MW518_210831	0089_MW516_210831
				Sampling date / time	31-Aug-2021 12:03	31-Aug-2021 12:19	31-Aug-2021 12:21	31-Aug-2021 12:50	31-Aug-2021 13:10
Compound	CAS Number	LOR	Unit		EP2110073-011	EP2110073-012	EP2110073-013	EP2110073-014	EP2110073-015
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	**0.06**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	00089_MW264_210831	0089_MW261_210831	0089_MW010_210831	0089_MW518_210831	0089_MW516_210831
				Sampling date / time	31-Aug-2021 12:03	31-Aug-2021 12:19	31-Aug-2021 12:21	31-Aug-2021 12:50	31-Aug-2021 13:10
Compound	CAS Number	LOR	Unit		EP2110073-011	EP2110073-012	EP2110073-013	EP2110073-014	EP2110073-015
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.54**	**0.13**	**0.06**	<0.01	**6.70**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.54**	**0.13**	**0.06**	<0.01	**6.22**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.54**	**0.13**	**0.06**	<0.01	**6.49**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.3**	**98.9**	**99.3**	**95.0**	**100**
13C8-PFOA	----	0.02	%		**98.4**	**96.1**	**95.9**	**98.2**	**100**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW268_210831	0089_MW269_210831	----	----	----
				Sampling date / time	31-Aug-2021 14:00	31-Aug-2021 14:16	----	----	----
Compound	CAS Number	LOR	Unit		EP2110073-016	EP2110073-017	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		474	424	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		474	424	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		788	87	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		1250	404	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		205	77	----	----	----
Magnesium	7439-95-4	1	mg/L		211	58	----	----	----
Sodium	7440-23-5	1	mg/L		806	234	----	----	----
Potassium	7440-09-7	1	mg/L		50	18	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		61.1	21.7	----	----	----
ø Total Cations	----	0.01	meq/L		63.9	19.2	----	----	----
ø Ionic Balance	----	0.01	%		2.24	5.92	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.06	0.07	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.09	0.10	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.41	0.59	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	0.41	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	0.03	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		0.04	0.14	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW268_210831	0089_MW269_210831	----	----	----
				Sampling date / time	31-Aug-2021 14:00	31-Aug-2021 14:16	----	----	----
Compound	CAS Number	LOR	Unit		EP2110073-016	EP2110073-017	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.01**	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW268_210831	0089_MW269_210831	----	----	----
				Sampling date / time	31-Aug-2021 14:00	31-Aug-2021 14:16	----	----	----
Compound	CAS Number	LOR	Unit		EP2110073-016	EP2110073-017	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.60**	**1.35**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.41**	**1.00**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.51**	**1.25**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**101**	----	----	----
13C8-PFOA	----	0.02	%		**97.6**	**101**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110073**	Page	: 1 of 13
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 02-Sep-2021
C-O-C number	: 27030	Issue Date	: 13-Sep-2021
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 17		
No. of samples analysed	: 17		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3880388)									
EP2110071-012	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	666	662	0.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	666	662	0.6	0% - 20%
EP2110073-004	0089_MW257_210831	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	111	112	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	111	112	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3880389)									
EP2110073-014	0089_MW518_210831	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	387	385	0.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	387	385	0.6	0% - 20%
EP2110084-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	129	128	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	129	128	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3881216)									
EP2110071-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	55	56	2.5	0% - 20%
EP2110073-002	0089_MW259_210831	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	8	8	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3881217)									
EP2109734-047	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	45	46	0.0	0% - 20%
EP2109734-061	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	43	42	3.1	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 3881215)									
EP2110071-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	85	85	0.0	0% - 20%
EP2110073-002	0089_MW259_210831	ED045G: Chloride	16887-00-6	1	mg/L	38	40	3.7	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3881219)									
EP2109734-047	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	53	53	0.0	0% - 20%
EP2109734-061	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	51	52	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3880059)									
EP2110068-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	420	429	2.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1300	1340	2.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10100	10300	2.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	536	552	3.0	0% - 20%
EP2110073-008	0089_MW239_210831	ED093F: Calcium	7440-70-2	1	mg/L	78	80	3.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	14	14	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	25	25	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3888171)									
EP2110072-004	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110073-011	00089_MW264_210831	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.44	0.43	3.4	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.10	0.10	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3890232)									
ES2131718-005	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	2.14	2.05	4.1	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	74.0	65.4	12.3	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	4.25	4.48	5.3	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.05	<0.05	0.0	No Limit
ES2131718-006	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.52	0.46	11.3	0% - 50%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	11.0	11.0	0.5	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.42	0.40	6.1	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.64	0.78	19.1	0% - 50%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3890232) - continued									
ES2131718-006	Anonymous	EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.05	<0.05	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3888171)									
EP2110072-004	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110073-011	00089_MW264_210831	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3890232)									
ES2131718-005	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	8.42	8.64	2.7	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	11.2	10.1	10.8	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	24.8	23.4	6.0	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	3.60	3.10	14.9	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.32	0.40	19.4	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	0.22	0.18	22.8	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.2	<0.2	0.0	No Limit
ES2131718-006	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.76	1.78	1.4	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.65	1.45	12.9	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	4.00	4.15	3.7	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.50	0.55	9.5	0% - 50%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3890232) - continued									
ES2131718-006	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.08	0.06	30.8	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.2	<0.2	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3888171)									
EP2110072-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110073-011	00089_MW264_210831	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3890232)									
ES2131718-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3890232) - continued									
ES2131718-005	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.12	<0.12	0.0	No Limit
ES2131718-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.12	<0.12	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.12	<0.12	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3888171)									
EP2110072-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110073-011	00089_MW264_210831	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3890232)									
ES2131718-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3890232) - continued									
ES2131718-005	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	2.65	2.90	9.0	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.20	0.20	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2131718-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.70	0.68	4.3	0% - 50%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3888171)									
EP2110072-004	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110073-011	00089_MW264_210831	EP231X: Sum of PFAS	----	0.01	µg/L	0.54	0.53	1.9	0% - 20%
EP231P: PFAS Sums (QC Lot: 3890232)									
ES2131718-005	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	132	121	8.7	0% - 20%
ES2131718-006	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	21.3	21.3	0.2	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3880388)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	104	81.2	126
				<1	200 mg/L	101	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3880389)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	108	81.2	126
				<1	200 mg/L	99.8	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881216)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.8	87.7	113
				<1	500 mg/L	95.4	87.7	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881217)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.6	87.7	113
				<1	500 mg/L	100	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3881215)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	95.8	87.9	114
				<1	1000 mg/L	101	87.9	114
ED045G: Chloride by Discrete Analyser (QCLot: 3881219)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.0	87.9	114
				<1	1000 mg/L	105	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3880059)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.3	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.1	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.4	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3888171)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	107	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	93.4	68.0	131

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3888171) - continued								
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	92.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	88.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.0	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3890232)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	106	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	92.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	122	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	111	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	111	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3888171)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	83.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	89.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	85.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	87.0	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	95.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	86.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	83.2	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	76.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	81.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	83.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	95.4	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3890232)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	74.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	125	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	122	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	124	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	122	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	114	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	124	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	124	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	118	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	114	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3888171)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	86.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	72.3	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	70.8	62.6	147

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3888171) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	81.0	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	79.1	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	83.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	74.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3890232)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	124	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	117	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	115	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	114	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	91.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	98.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	88.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3888171)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	96.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	90.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	94.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	89.0	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3890232)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	96.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	117	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	112	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	108	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881216)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881216) - continued							
EP2110071-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	98.0	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3881217)							
EP2109734-047	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	90.8	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3881215)							
EP2110071-004	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	99.3	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3881219)							
EP2109734-047	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	99.4	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3888171)							
EP2110073-002	0089_MW259_210831	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	87.6	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	98.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	106	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	103	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	82.0	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3890232)							
ES2131718-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	# Not Determined	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	124	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	111	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	99.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	86.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	94.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3888171)							
EP2110073-002	0089_MW259_210831	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	89.6	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	95.2	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	91.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	96.4	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	102	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	92.0	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	89.2	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	91.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	86.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	90.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	106	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3890232)							
ES2131718-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	111	73.0	129

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3890232) - continued							
ES2131718-005	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	108	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	87.4	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	115	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	123	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	120	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	107	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	94.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	120	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3888171)							
EP2110073-002	0089_MW259_210831	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	98.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	69.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	74.2	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	103	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	93.5	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	87.8	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	82.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3890232)							
ES2131718-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	112	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	87.8	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	89.8	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	97.4	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	84.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	104	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	83.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3888171)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3888171) - continued							
EP2110073-002	0089_MW259_210831	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	102	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	103	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	108	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	95.8	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3890232)							
ES2131718-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	122	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	106	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	135	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	85.0	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110073**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 13-Sep-2021
Sampler	: [redacted]	No. of samples received	: 17
Order number	: DEF19009/730	No. of samples analysed	: 17

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	ES2131718--005	Anonymous	**Perfluorobutane sulfonic acid (PFBS)**	375-73-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	ES2131718--005	Anonymous	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	ES2131718--005	Anonymous	**Perfluorohexanoic acid (PFHxA)**	307-24-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW236_210831, 0089_MW259_210831, 0089_MW255_210831, 0089_MW257_210831, 0089_MW243_210831, 0089_MW240_210831, 0089_MW238_210831, 0089_MW239_210831, 0089_MW245_210831, 0089_MW242_210831, 00089_MW264_210831, 0089_MW261_210831, 0089_MW010_210831, 0089_MW518_210831, 0089_MW516_210831, 0089_MW268_210831, 0089_MW269_210831	**31-Aug-2021**	**----**	----	----	**02-Sep-2021**	14-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW236_210831, 0089_MW259_210831, 0089_MW255_210831, 0089_MW257_210831, 0089_MW243_210831, 0089_MW240_210831, 0089_MW238_210831, 0089_MW239_210831, 0089_MW245_210831, 0089_MW242_210831, 00089_MW264_210831, 0089_MW261_210831, 0089_MW010_210831, 0089_MW518_210831, 0089_MW516_210831, 0089_MW268_210831, 0089_MW269_210831	**31-Aug-2021**	**----**	----	----	**13-Sep-2021**	28-Sep-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW236_210831, 0089_MW259_210831, 0089_MW255_210831, 0089_MW257_210831, 0089_MW243_210831, 0089_MW240_210831, 0089_MW238_210831, 0089_MW239_210831, 0089_MW245_210831, 0089_MW242_210831, 00089_MW264_210831, 0089_MW261_210831, 0089_MW010_210831, 0089_MW518_210831, 0089_MW516_210831, 0089_MW268_210831, 0089_MW269_210831	**31-Aug-2021**	**----**	----	----	**13-Sep-2021**	28-Sep-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW236_210831, 0089_MW259_210831, 0089_MW255_210831, 0089_MW257_210831, 0089_MW243_210831, 0089_MW240_210831, 0089_MW238_210831, 0089_MW239_210831, 0089_MW245_210831, 0089_MW242_210831, 00089_MW264_210831, 0089_MW261_210831, 0089_MW010_210831, 0089_MW518_210831, 0089_MW516_210831, 0089_MW268_210831, 0089_MW269_210831	**31-Aug-2021**	**----**	----	----	**03-Sep-2021**	07-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW236_210831, 0089_MW259_210831, 0089_MW255_210831, 0089_MW257_210831, 0089_MW243_210831, 0089_MW240_210831, 0089_MW238_210831, 0089_MW239_210831, 0089_MW245_210831, 0089_MW242_210831, 00089_MW264_210831, 0089_MW261_210831, 0089_MW010_210831, 0089_MW518_210831, 0089_MW516_210831, 0089_MW268_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
HDPE (no PTFE) (EP231X)							
0089_MW269_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**09-Sep-2021**	27-Feb-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW236_210831, 0089_MW259_210831, 0089_MW255_210831, 0089_MW257_210831, 0089_MW243_210831, 0089_MW240_210831, 0089_MW238_210831, 0089_MW239_210831, 0089_MW245_210831, 0089_MW242_210831, 00089_MW264_210831, 0089_MW261_210831, 0089_MW010_210831, 0089_MW518_210831, 0089_MW516_210831, 0089_MW268_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
HDPE (no PTFE) (EP231X)							
0089_MW269_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**09-Sep-2021**	27-Feb-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW236_210831, 0089_MW259_210831, 0089_MW255_210831, 0089_MW257_210831, 0089_MW243_210831, 0089_MW240_210831, 0089_MW238_210831, 0089_MW239_210831, 0089_MW245_210831, 0089_MW242_210831, 00089_MW264_210831, 0089_MW261_210831, 0089_MW010_210831, 0089_MW518_210831, 0089_MW516_210831, 0089_MW268_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
HDPE (no PTFE) (EP231X)							
0089_MW269_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**09-Sep-2021**	27-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW236_210831, 0089_MW259_210831, 0089_MW255_210831, 0089_MW257_210831, 0089_MW243_210831, 0089_MW240_210831, 0089_MW238_210831, 0089_MW239_210831, 0089_MW245_210831, 0089_MW242_210831, 00089_MW264_210831, 0089_MW261_210831, 0089_MW010_210831, 0089_MW518_210831, 0089_MW516_210831, 0089_MW268_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
HDPE (no PTFE) (EP231X)							
0089_MW269_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**09-Sep-2021**	27-Feb-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW236_210831, 0089_MW259_210831, 0089_MW255_210831, 0089_MW257_210831, 0089_MW243_210831, 0089_MW240_210831, 0089_MW238_210831, 0089_MW239_210831, 0089_MW245_210831, 0089_MW242_210831, 00089_MW264_210831, 0089_MW261_210831, 0089_MW010_210831, 0089_MW518_210831, 0089_MW516_210831, 0089_MW268_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**08-Sep-2021**	27-Feb-2022	✓
HDPE (no PTFE) (EP231X)							
0089_MW269_210831	**31-Aug-2021**	**08-Sep-2021**	27-Feb-2022	✓	**09-Sep-2021**	27-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110073**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27030	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 01-Sep-2021 13:15	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 13-Sep-2021	Scheduled Reporting Date	: **13-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 8.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 17 / 17

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110073-001	31-Aug-2021 08:51	0089_MW236_210831	✓	✓	✓	✓
EP2110073-002	31-Aug-2021 09:04	0089_MW259_210831	✓	✓	✓	✓
EP2110073-003	31-Aug-2021 09:34	0089_MW255_210831	✓	✓	✓	✓
EP2110073-004	31-Aug-2021 09:56	0089_MW257_210831	✓	✓	✓	✓
EP2110073-005	31-Aug-2021 10:18	0089_MW243_210831	✓	✓	✓	✓
EP2110073-006	31-Aug-2021 10:35	0089_MW240_210831	✓	✓	✓	✓
EP2110073-007	31-Aug-2021 10:48	0089_MW238_210831	✓	✓	✓	✓
EP2110073-008	31-Aug-2021 10:54	0089_MW239_210831	✓	✓	✓	✓
EP2110073-009	31-Aug-2021 11:05	0089_MW245_210831	✓	✓	✓	✓
EP2110073-010	31-Aug-2021 11:47	0089_MW242_210831	✓	✓	✓	✓
EP2110073-011	31-Aug-2021 12:03	00089_MW264_210831	✓	✓	✓	✓
EP2110073-012	31-Aug-2021 12:19	0089_MW261_210831	✓	✓	✓	✓
EP2110073-013	31-Aug-2021 12:21	0089_MW010_210831	✓	✓	✓	✓
EP2110073-014	31-Aug-2021 12:50	0089_MW518_210831	✓	✓	✓	✓
EP2110073-015	31-Aug-2021 13:10	0089_MW516_210831	✓	✓	✓	✓
EP2110073-016	31-Aug-2021 14:00	0089_MW268_210831	✓	✓	✓	✓
EP2110073-017	31-Aug-2021 14:16	0089_MW269_210831	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2110073

Telephone : -- 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno **Project Man** [redacted]

Phone:

ALS Compass COC Reference: ~~27042, 27025~~ 27027, 27028, 27023, 27030, 27056 **# Samples:**

Sampler:

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send 1 esky to Eurofins for trips.

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 31/08/21, 5pm	Date / Time: 1/9/21 1315	Date / Time:	Date / Time:

CHAIN OF CUSTODY

(ALS) COC#: **27030** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW236		31/08/2021 08:51 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0089_MW259	2 extra pfas bottles collected fot lab internal qc	31/08/2021 09:04 AM	Water	ALS: 5 Non ALS: 0	No	Partial 5/8		
003	0089_MW255		31/08/2021 09:34 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0089_MW257		31/08/2021 09:56 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0089_MW243		31/08/2021 10:18 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0089_MW240		31/08/2021 10:35 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
007	0089_MW238		31/08/2021 10:48 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
008	0089_MW239		31/08/2021 10:54 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
009	0089_MW245		31/08/2021 11:05 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

COC#: **27030** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_MW242		31/08/2021 11:47 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
011	00089_MW264	Extra pfas bottles collected for internal qc analysis	31/08/2021 12:03 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		
012	0089_MW261		31/08/2021 12:19 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
013	0089_MW010		31/08/2021 12:21 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
014	0089_MW518		31/08/2021 12:50 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
015	0089_MW516		31/08/2021 01:10 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
016	0089_MW268		31/08/2021 02:00 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
017	0089_MW269		31/08/2021 02:16 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

COC#: 27030 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free Ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW236	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW259	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EA015H Total Dissolved Solids - Standard Level - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW255	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW257	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_MW243	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0089_MW240	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_MW238	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_MW239	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_MW245	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **27030** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

010	0089_MW242	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	00089_MW264	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
012	0089_MW261	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
013	0089_MW010	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
014	0089_MW518	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
015	0089_MW516	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
016	0089_MW268	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
017	0089_MW269	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 27030 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO:

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW236	Clear Plastic Bottle - Natural	250 mL	00070520069486	Green	No	
001	0089_MW236	HDPE (no PTFE)	20 mL	00352101017095	Grey	No	
001	0089_MW236	HDPE (no PTFE)	20 mL	00352101020535	Grey	No	
002	0089_MW259	Clear Plastic Bottle - Natural	250 mL	00070520069398	Green	No	
002	0089_MW259	HDPE (no PTFE)	20 mL	00352101020542	Grey	No	
002	0089_MW259	HDPE (no PTFE)	20 mL	00352101016886	Grey	No	
002	0089_MW259	HDPE (no PTFE)	20 mL	00352101017274	Grey	No	
002	0089_MW259	HDPE (no PTFE)	20 mL	00352101017022	Grey	No	
003	0089_MW255	Clear Plastic Bottle - Natural	250 mL	00070520069376	Green	No	
003	0089_MW255	HDPE (no PTFE)	20 mL	00352101017157	Grey	No	
003	0089_MW255	HDPE (no PTFE)	20 mL	00352101020560	Grey	No	
004	0089_MW257	Clear Plastic Bottle - Natural	250 mL	00070520069496	Green	No	
004	0089_MW257	HDPE (no PTFE)	20 mL	00352101016939	Grey	No	
004	0089_MW257	HDPE (no PTFE)	20 mL	00352101016919	Grey	No	
005	0089_MW243	Clear Plastic Bottle - Natural	250 mL	00070520069490	Green	No	
005	0089_MW243	HDPE (no PTFE)	20 mL	00352101017162	Grey	No	
005	0089_MW243	HDPE (no PTFE)	20 mL	00352101017165	Grey	No	
006	0089_MW240	Clear Plastic Bottle - Natural	250 mL	00070520069483	Green	No	
006	0089_MW240	HDPE (no PTFE)	20 mL	00352101020524	Grey	No	
006	0089_MW240	HDPE (no PTFE)	20 mL	00352101020565	Grey	No	
007	0089_MW238	Clear Plastic Bottle - Natural	250 mL	00070520069477	Green	No	
007	0089_MW238	HDPE (no PTFE)	20 mL	00352101020594	Grey	No	
007	0089_MW238	HDPE (no PTFE)	20 mL	00352101020536	Grey	No	
008	0089_MW239	Clear Plastic Bottle - Natural	250 mL	00070520069478	Green	No	
008	0089_MW239	HDPE (no PTFE)	20 mL	00352101016922	Grey	No	
008	0089_MW239	HDPE (no PTFE)	20 mL	00352101017288	Grey	No	

CHAIN OF CUSTODY

COC#: **27030** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

009	0089_MW245	Clear Plastic Bottle - Natural	250 mL	00070520069476	Green	No	
009	0089_MW245	HDPE (no PTFE)	20 mL	00352101020561	Grey	No	
009	0089_MW245	HDPE (no PTFE)	20 mL	00352101017144	Grey	No	
010	0089_MW242	Clear Plastic Bottle - Natural	250 mL	00070520069324	Green	No	
010	0089_MW242	HDPE (no PTFE)	20 mL	00352101017182	Grey	No	
010	0089_MW242	HDPE (no PTFE)	20 mL	00352101017010	Grey	No	
011	00089_MW264	HDPE (no PTFE)	20 mL	00352101016964	Grey	No	
011	00089_MW264	HDPE (no PTFE)	20 mL	00352101020513	Grey	No	
011	00089_MW264	Clear Plastic Bottle - Natural	250 mL	00070520069494	Green	No	
011	00089_MW264	HDPE (no PTFE)	20 mL	00352101017020	Grey	No	
011	00089_MW264	HDPE (no PTFE)	20 mL	00352101017231	Grey	No	
012	0089_MW261	Clear Plastic Bottle - Natural	250 mL	00070520069453	Green	No	
012	0089_MW261	HDPE (no PTFE)	20 mL	00352101017181	Grey	No	
012	0089_MW261	HDPE (no PTFE)	20 mL	00352101017048	Grey	No	
013	0089_MW010	Clear Plastic Bottle - Natural	250 mL	00070520069482	Green	No	
013	0089_MW010	HDPE (no PTFE)	20 mL	00352101017207	Grey	No	
013	0089_MW010	HDPE (no PTFE)	20 mL	00352101020591	Grey	No	
014	0089_MW518	Clear Plastic Bottle - Natural	250 mL	00070520069465	Green	No	
014	0089_MW518	HDPE (no PTFE)	20 mL	00352101020609	Grey	No	
014	0089_MW518	HDPE (no PTFE)	20 mL	00352101017085	Grey	No	
015	0089_MW516	Clear Plastic Bottle - Natural	250 mL	00070520069459	Green	No	
015	0089_MW516	HDPE (no PTFE)	20 mL	00352101020649	Grey	No	
015	0089_MW516	HDPE (no PTFE)	20 mL	00352101020530	Grey	No	
016	0089_MW268	Clear Plastic Bottle - Natural	250 mL	00070520069484	Green	No	
016	0089_MW268	HDPE (no PTFE)	20 mL	00352101016907	Grey	No	
016	0089_MW268	HDPE (no PTFE)	20 mL	00352101017000	Grey	No	
017	0089_MW269	Clear Plastic Bottle - Natural	250 mL	00070520069329	Green	No	

CHAIN OF CUSTODY

COC#: **27030** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: DEF19009/Stirling GW JS

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

017	0089_MW269	HDPE (no PTFE)	20 mL	00352101016900	Grey	No	
017	0089_MW269	HDPE (no PTFE)	20 mL	00352101020558	Grey	No	

Total Bottle Count: ALS: 55, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110074**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021 13:15
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27042	Issue Date	: 10-Sep-2021 14:26
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD306_210831	0089_QC115_210831	0089_SD315_210831	0089_SD308_210831	----
			Sampling date / time	31-Aug-2021 11:27	31-Aug-2021 11:29	31-Aug-2021 11:47	31-Aug-2021 12:44	----
Compound	CAS Number	LOR	Unit	EP2110074-001	EP2110074-002	EP2110074-003	EP2110074-004	--------
				Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**22.2**	**21.1**	**11.9**	**16.8**	**----**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	**----**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	**----**
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	**----**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD306_210831	0089_QC115_210831	0089_SD315_210831	0089_SD308_210831	----
				Sampling date / time	31-Aug-2021 11:27	31-Aug-2021 11:29	31-Aug-2021 11:47	31-Aug-2021 12:44	----
Compound	CAS Number	LOR	Unit		EP2110074-001	EP2110074-002	EP2110074-003	EP2110074-004	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**98.5**	**92.0**	**91.0**	**94.5**	----
13C8-PFOA	----	0.0002	%		**102**	**98.0**	**98.5**	**101**	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110074**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27042	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3894078)									
EP2110067-003	Anonymous	EA055: Moisture Content	----	0.1	%	22.4	20.0	11.5	0% - 20%
EP2110231-004	Anonymous	EA055: Moisture Content	----	0.1	%	7.4	7.6	2.5	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3886518)									
EP2110067-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3886518)									
EP2110067-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3886518)									
EP2110067-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3886518) - continued									
EP2110067-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3886518)									
EP2110067-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3886518)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.2	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3886518)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	79.8	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.2	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.0	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.4	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3886518)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.0	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.1	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.5	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.9	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3886518)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	75.6	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	82.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	82.8	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3886518) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	93.2	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3886518)							
EP2110067-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	80.0	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	82.0	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	83.2	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	82.4	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	80.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	87.2	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3886518)							
EP2110067-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	81.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	81.2	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	89.2	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	93.2	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	89.2	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	92.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	88.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	89.2	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	83.6	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	73.6	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	98.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3886518)							
EP2110067-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	86.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	90.9	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	85.4	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	87.5	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	84.6	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	87.6	63.0	144

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3886518) - continued							
EP2110067-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	86.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3886518)							
EP2110067-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	76.8	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	82.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	89.2	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	100	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110074**	Page	: 1 of 4
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 01-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 10-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 4
Order number	: DEF19009/730	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
0089_SD306_210831, 0089_QC115_210831, 0089_SD315_210831, 0089_SD308_210831	**31-Aug-2021**	**----**	----	----	**09-Sep-2021**	14-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD306_210831, 0089_QC115_210831, 0089_SD315_210831, 0089_SD308_210831	**31-Aug-2021**	**07-Sep-2021**	27-Feb-2022	✓	**07-Sep-2021**	17-Oct-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD306_210831, 0089_QC115_210831, 0089_SD315_210831, 0089_SD308_210831	**31-Aug-2021**	**07-Sep-2021**	27-Feb-2022	✓	**07-Sep-2021**	17-Oct-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD306_210831, 0089_QC115_210831, 0089_SD315_210831, 0089_SD308_210831	**31-Aug-2021**	**07-Sep-2021**	27-Feb-2022	✓	**07-Sep-2021**	17-Oct-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD306_210831, 0089_QC115_210831, 0089_SD315_210831, 0089_SD308_210831	**31-Aug-2021**	**07-Sep-2021**	27-Feb-2022	✓	**07-Sep-2021**	17-Oct-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD306_210831, 0089_QC115_210831, 0089_SD315_210831, 0089_SD308_210831	**31-Aug-2021**	**07-Sep-2021**	27-Feb-2022	✓	**07-Sep-2021**	17-Oct-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110074**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27042	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 01-Sep-2021 13:15	Issue Date	: 02-Sep-2021
Client Requested Due Date	: 13-Sep-2021	Scheduled Reporting Date	: **13-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 8.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2110074-001	31-Aug-2021 11:27	0089_SD306_210831	✓	✓
EP2110074-002	31-Aug-2021 11:29	0089_QC115_210831	✓	✓
EP2110074-003	31-Aug-2021 11:47	0089_SD315_210831	✓	✓
EP2110074-004	31-Aug-2021 12:44	0089_SD308_210831	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110074

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno **Project Manag** [redacted]

Phone:

ALS Compass COC Reference: 27027, 27028, 27023, 27025 **# Samples:**

27027, 27023, 27030, 27056

Sampler:

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send 1 esky to Eurofins for trips.

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 31/08/21, 5pm	Date / Time: 1/9/21 1315	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: **27042** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD306		31/08/2021 11:27 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
002	0089_QC115		31/08/2021 11:29 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
003	0089_SD315		31/08/2021 11:47 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
004	0089_SD308		31/08/2021 12:44 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		

CHAIN OF CUSTODY

COC#: **27042** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SD306	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
002	0089_QC115	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
003	0089_SD315	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
004	0089_SD308	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: 27042 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD306	HDPE Soil Jar	200 mL	00621019042978	Grey	No	
002	0089_QC115	HDPE Soil Jar	200 mL	00621019042982	Grey	No	
003	0089_SD315	HDPE Soil Jar	200 mL	00621019058270	Grey	No	
004	0089_SD308	HDPE Soil Jar	200 mL	00621019042977	Grey	No	

Total Bottle Count: ALS: 4, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110154**	Page	: 1 of 12
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021 14:15
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27085	Issue Date	: 15-Sep-2021 12:57
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 11		
No. of samples analysed	: 11		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC118_210901	0089_PW345_210901	0089_PW375_210901	0089_PW374_210901	0089_PW378_210901
				Sampling date / time	01-Sep-2021 09:56	01-Sep-2021 10:09	01-Sep-2021 11:36	01-Sep-2021 11:37	01-Sep-2021 11:37
Compound	CAS Number	LOR	Unit		EP2110154-002	EP2110154-003	EP2110154-008	EP2110154-009	EP2110154-010
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		308	490	119	118	119
Total Alkalinity as CaCO3	----	1	mg/L		308	490	119	118	119
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1120	1820	2430	2240	2240
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		7740	14200	17500	17700	18000
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		208	371	460	436	453
Magnesium	7439-95-4	1	mg/L		598	1080	1480	1390	1460
Sodium	7440-23-5	1	mg/L		4490	8150	11400	10800	11300
Potassium	7440-09-7	1	mg/L		276	458	603	566	598
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		248	448	547	548	557
ø Total Cations	----	0.01	meq/L		262	474	656	620	650
ø Ionic Balance	----	0.01	%		2.78	2.75	9.10	6.17	7.69
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	0.05	0.01	0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_QC118_210901	0089_PW345_210901	0089_PW375_210901	0089_PW374_210901	0089_PW378_210901
				Sampling date / time	01-Sep-2021 09:56	01-Sep-2021 10:09	01-Sep-2021 11:36	01-Sep-2021 11:37	01-Sep-2021 11:37
Compound	CAS Number	LOR	Unit		EP2110154-002	EP2110154-003	EP2110154-008	EP2110154-009	EP2110154-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_QC118_210901	0089_PW345_210901	0089_PW375_210901	0089_PW374_210901	0089_PW378_210901
				Sampling date / time	01-Sep-2021 09:56	01-Sep-2021 10:09	01-Sep-2021 11:36	01-Sep-2021 11:37	01-Sep-2021 11:37
					EP2110154-002	EP2110154-003	EP2110154-008	EP2110154-009	EP2110154-010
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.05**	**0.01**	**0.01**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.05**	**0.01**	**0.01**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.05**	**0.01**	**0.01**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.3**	**93.9**	**92.5**	**95.6**	**98.9**
13C8-PFOA	----	0.02	%		**101**	**99.4**	**101**	**104**	**101**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW411_210901	----	----	----	----
				Sampling date / time	01-Sep-2021 12:30	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110154-011	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**121**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**121**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2290**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**18100**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**456**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**1460**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**11300**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**604**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**561**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**650**	----	----	----	----
ø Ionic Balance	----	0.01	%		**7.37**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW411_210901	----	----	----	----
			Sampling date / time		01-Sep-2021 12:30	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110154-011	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_PW411_210901	----	----	----	----
				Sampling date / time	01-Sep-2021 12:30	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110154-011	--------	--------	--------	--------
					Result	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**103**	----	----	----	----
13C8-PFOA	----	0.02	%		**105**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW369_210901	0089_SW370_210901	0089_SW371_210901	0089_SW305_210901	0089_SW372_210901
				Sampling date / time	01-Sep-2021 09:54	01-Sep-2021 10:11	01-Sep-2021 10:57	01-Sep-2021 11:05	01-Sep-2021 11:14
Compound	CAS Number	LOR	Unit		EP2110154-001	EP2110154-004	EP2110154-005	EP2110154-006	EP2110154-007
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		317	122	119	118	120
Total Alkalinity as CaCO3	----	1	mg/L		317	122	119	118	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1170	2250	2220	2250	2220
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		7940	17600	17600	17200	17500
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		208	440	433	422	445
Magnesium	7439-95-4	1	mg/L		594	1400	1390	1340	1420
Sodium	7440-23-5	1	mg/L		4460	10900	10800	10400	10900
Potassium	7440-09-7	1	mg/L		269	572	567	546	580
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		255	546	545	534	542
ø Total Cations	----	0.01	meq/L		260	626	620	598	628
ø Ionic Balance	----	0.01	%		1.06	6.84	6.45	5.59	7.33
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_PW369_210901	0089_SW370_210901	0089_SW371_210901	0089_SW305_210901	0089_SW372_210901
				Sampling date / time	01-Sep-2021 09:54	01-Sep-2021 10:11	01-Sep-2021 10:57	01-Sep-2021 11:05	01-Sep-2021 11:14
Compound	CAS Number	LOR	Unit		EP2110154-001	EP2110154-004	EP2110154-005	EP2110154-006	EP2110154-007
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_PW369_210901	0089_SW370_210901	0089_SW371_210901	0089_SW305_210901	0089_SW372_210901
				Sampling date / time	01-Sep-2021 09:54	01-Sep-2021 10:11	01-Sep-2021 10:57	01-Sep-2021 11:05	01-Sep-2021 11:14
					EP2110154-001	EP2110154-004	EP2110154-005	EP2110154-006	EP2110154-007
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**91.7**	**97.5**	**94.9**	**93.3**	**97.2**
13C8-PFOA	----	0.02	%		**100**	**102**	**105**	**104**	**102**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110154**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27085	Issue Date	: 15-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 11		
No. of samples analysed	: 11		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3887722)									
EP2110154-002	0089_QC118_210901	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	308	307	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	308	307	0.0	0% - 20%
EP2110154-011	0089_PW411_210901	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	121	125	2.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	121	125	2.8	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3883660)									
EP2110154-001	0089_PW369_210901	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1170	1170	0.0	0% - 20%
EP2110154-011	0089_PW411_210901	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2290	2320	1.3	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3883659)									
EP2110154-001	0089_PW369_210901	ED045G: Chloride	16887-00-6	1	mg/L	7940	7980	0.6	0% - 20%
EP2110154-011	0089_PW411_210901	ED045G: Chloride	16887-00-6	1	mg/L	18100	17600	2.8	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3885396)									
EP2110154-001	0089_PW369_210901	ED093F: Calcium	7440-70-2	1	mg/L	208	214	2.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	594	614	3.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	4460	4600	3.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	269	278	3.2	0% - 20%
EP2110154-011	0089_PW411_210901	ED093F: Calcium	7440-70-2	1	mg/L	456	461	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1460	1470	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11300	11300	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	604	606	0.3	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3891857)									
EP2110154-001	0089_PW369_210901	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3891857)									
EP2110154-001	0089_PW369_210901	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3891857)									
EP2110154-001	0089_PW369_210901	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3891857)									
EP2110154-001	0089_PW369_210901	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3891857) - continued									
EP2110154-001	0089_PW369_210901	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3891857)									
EP2110154-001	0089_PW369_210901	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3887722)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	107	81.2	126
				<1	200 mg/L	100	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3883660)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.3	87.7	113
				<1	500 mg/L	97.2	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3883659)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.6	87.9	114
				<1	1000 mg/L	102	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3885396)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.5	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.9	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.3	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3891857)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	84.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	92.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	79.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	97.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	92.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	87.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891857)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	83.5	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	88.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	84.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	90.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	94.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	81.6	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	80.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	78.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	85.6	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891857) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	76.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	103	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3891857)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	90.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	91.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	104	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	80.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	87.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	79.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3891857)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	87.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	83.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	93.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	110	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3883660)							
EP2110154-001	0089_PW369_210901	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3883659)							
EP2110154-001	0089_PW369_210901	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3891857)							
EP2110154-006	0089_SW305_210901	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	86.0	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	86.8	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	75.8	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	115	69.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3891857) - continued							
EP2110154-006	0089_SW305_210901	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	89.9	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	53.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891857)							
EP2110154-006	0089_SW305_210901	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	83.4	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	86.2	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	84.2	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	89.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	91.2	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	75.6	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	81.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	73.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	82.8	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	65.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3891857)							
EP2110154-006	0089_SW305_210901	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	90.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	87.0	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	73.5	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	87.4	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	68.4	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	83.6	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	73.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3891857)							
EP2110154-006	0089_SW305_210901	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	75.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	75.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	72.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110154**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 15-Sep-2021
Sampler	: [redacted]	No. of samples received	: 11
Order number	: DEF19009/730	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2110154--001	0089_PW369_210901	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2110154--001	0089_PW369_210901	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	11	9.09	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / Client Sample ID(s)	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_PW369_210901, 0089_QC118_210901, 0089_PW345_210901, 0089_SW370_210901, 0089_SW371_210901, 0089_SW305_210901, 0089_SW372_210901, 0089_PW375_210901, 0089_PW374_210901, 0089_PW378_210901, 0089_PW411_210901	**01-Sep-2021**	**----**	----	----	**07-Sep-2021**	15-Sep-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_PW369_210901, 0089_QC118_210901, 0089_PW345_210901, 0089_SW370_210901, 0089_SW371_210901, 0089_SW305_210901, 0089_SW372_210901, 0089_PW375_210901, 0089_PW374_210901, 0089_PW378_210901, 0089_PW411_210901	**01-Sep-2021**	**----**	----	----	**14-Sep-2021**	29-Sep-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_PW369_210901, 0089_QC118_210901, 0089_PW345_210901, 0089_SW370_210901, 0089_SW371_210901, 0089_SW305_210901, 0089_SW372_210901, 0089_PW375_210901, 0089_PW374_210901, 0089_PW378_210901, 0089_PW411_210901	**01-Sep-2021**	**----**	----	----	**14-Sep-2021**	29-Sep-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_PW369_210901, 0089_QC118_210901, 0089_PW345_210901, 0089_SW370_210901, 0089_SW371_210901, 0089_SW305_210901, 0089_SW372_210901, 0089_PW375_210901, 0089_PW374_210901, 0089_PW378_210901, 0089_PW411_210901	**01-Sep-2021**	**----**	----	----	**07-Sep-2021**	08-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW369_210901, 0089_QC118_210901, 0089_PW345_210901, 0089_SW370_210901, 0089_SW371_210901, 0089_SW305_210901, 0089_SW372_210901, 0089_PW375_210901, 0089_PW374_210901, 0089_PW378_210901, 0089_PW411_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW369_210901, 0089_QC118_210901, 0089_PW345_210901, 0089_SW370_210901, 0089_SW371_210901, 0089_SW305_210901, 0089_SW372_210901, 0089_PW375_210901, 0089_PW374_210901, 0089_PW378_210901, 0089_PW411_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_PW369_210901, 0089_QC118_210901, 0089_PW345_210901, 0089_SW370_210901, 0089_SW371_210901, 0089_SW305_210901, 0089_SW372_210901, 0089_PW375_210901, 0089_PW374_210901, 0089_PW378_210901, 0089_PW411_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_PW369_210901, 0089_QC118_210901, 0089_PW345_210901, 0089_SW370_210901, 0089_SW371_210901, 0089_SW305_210901, 0089_SW372_210901, 0089_PW375_210901, 0089_PW374_210901, 0089_PW378_210901, 0089_PW411_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_PW369_210901, 0089_QC118_210901, 0089_PW345_210901, 0089_SW370_210901, 0089_SW371_210901, 0089_SW305_210901, 0089_SW372_210901, 0089_PW375_210901, 0089_PW374_210901, 0089_PW378_210901, 0089_PW411_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110154**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27085	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 02-Sep-2021 14:15	Issue Date	: 03-Sep-2021
Client Requested Due Date	: 15-Sep-2021	Scheduled Reporting Date	: **15-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 16.8 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 11 / 11

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110154-001	01-Sep-2021 09:54	0089_PW369_210901	✓	✓	✓	✓
EP2110154-002	01-Sep-2021 09:56	0089_QC118_210901	✓	✓	✓	✓
EP2110154-003	01-Sep-2021 10:09	0089_PW345_210901	✓	✓	✓	✓
EP2110154-004	01-Sep-2021 10:11	0089_SW370_210901	✓	✓	✓	✓
EP2110154-005	01-Sep-2021 10:57	0089_SW371_210901	✓	✓	✓	✓
EP2110154-006	01-Sep-2021 11:05	0089_SW305_210901	✓	✓	✓	✓
EP2110154-007	01-Sep-2021 11:14	0089_SW372_210901	✓	✓	✓	✓
EP2110154-008	01-Sep-2021 11:36	0089_PW375_210901	✓	✓	✓	✓
EP2110154-009	01-Sep-2021 11:37	0089_PW374_210901	✓	✓	✓	✓
EP2110154-010	01-Sep-2021 11:37	0089_PW378_210901	✓	✓	✓	✓
EP2110154-011	01-Sep-2021 12:30	0089_PW411_210901	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING Intelligence

ALS

Environmental Division
Perth
Work Order Reference
EP2110154

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno **Project Manager:** [redacted]

#27107, 27085, 27087, 27093

ALS Compass COC Reference: #27086, 27088 **# Samples:** 2 eskies **Phone:**

Sampler: [redacted]

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send Eurofins Trip to their lab (QC218)

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time:	**Date / Time:**	**Date / Time:**	**Date / Time:**
01/02/21 5pm	2/9 1415		

CHAIN OF CUSTODY

(ALS) COC#: **27085** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_PW369	2 extra lab qc pfas bottles	01/09/2021 09:54 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		
002	0089_QC118		01/09/2021 09:56 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0089_PW345		01/09/2021 10:09 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0089_SW370		01/09/2021 10:11 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0089_SW371		01/09/2021 10:57 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0089_SW305	extra pfas qc bottles	01/09/2021 11:05 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		
007	0089_SW372		01/09/2021 11:14 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
008	0089_PW375		01/09/2021 11:36 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
009	0089_PW374		01/09/2021 11:37 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

(ALS) COC#: **27085** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_PW378		01/09/2021 11:37 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
011	0089_PW411		01/09/2021 12:30 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

COC#: **27085** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_PW369	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_QC118	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_PW345	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_SW370	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0089_SW371	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0089_SW305	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_SW372	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_PW375	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_PW374	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **27085** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

010	0089_PW378	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_PW411	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **27085** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_PW369	HDPE (no PTFE)	20 mL	00350019151359	Grey	No	
001	0089_PW369	HDPE (no PTFE)	20 mL	00350019130730	Grey	No	
001	0089_PW369	HDPE (no PTFE)	20 mL	00350019150426	Grey	No	
001	0089_PW369	HDPE (no PTFE)	20 mL	00350019151263	Grey	No	
001	0089_PW369	Clear Plastic Bottle - Natural	250 mL	00071018014741	Green	No	
002	0089_QC118	Clear Plastic Bottle - Natural	250 mL	00071018014746	Green	No	
002	0089_QC118	HDPE (no PTFE)	20 mL	00350019151599	Grey	No	
002	0089_QC118	HDPE (no PTFE)	20 mL	00350019130807	Grey	No	
003	0089_PW345	Clear Plastic Bottle - Natural	250 mL	00071018014721	Green	No	
003	0089_PW345	HDPE (no PTFE)	20 mL	00350019130872	Grey	No	
003	0089_PW345	HDPE (no PTFE)	20 mL	00350019130825	Grey	No	
004	0089_SW370	HDPE (no PTFE)	20 mL	00350019130934	Grey	No	
004	0089_SW370	HDPE (no PTFE)	20 mL	00350019130907	Grey	No	
004	0089_SW370	Clear Plastic Bottle - Natural	250 mL	00071018014862	Green	No	
005	0089_SW371	Clear Plastic Bottle - Natural	250 mL	00071018014785	Green	No	
005	0089_SW371	HDPE (no PTFE)	20 mL	00350019151551	Grey	No	
005	0089_SW371	HDPE (no PTFE)	20 mL	00350019130864	Grey	No	
006	0089_SW305	HDPE (no PTFE)	20 mL	00350019164179	Grey	No	
006	0089_SW305	HDPE (no PTFE)	20 mL	00352010040346	Grey	No	
006	0089_SW305	HDPE (no PTFE)	20 mL	00350019151388	Grey	No	
006	0089_SW305	HDPE (no PTFE)	20 mL	00350019130680	Grey	No	
006	0089_SW305	Clear Plastic Bottle - Natural	250 mL	00071018014834	Green	No	
007	0089_SW372	Clear Plastic Bottle - Natural	250 mL	00071018014796	Green	No	
007	0089_SW372	HDPE (no PTFE)	20 mL	00350019130823	Grey	No	
007	0089_SW372	HDPE (no PTFE)	20 mL	00350019151385	Grey	No	
008	0089_PW375	HDPE (no PTFE)	20 mL	00350019151591	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: **27085** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

008	0089_PW375	HDPE (no PTFE)	20 mL	00350019151531	Grey	No	
008	0089_PW375	Clear Plastic Bottle - Natural	250 mL	00071018014762	Green	No	
009	0089_PW374	Clear Plastic Bottle - Natural	250 mL	00071018014794	Green	No	
009	0089_PW374	HDPE (no PTFE)	20 mL	00350019130674	Grey	No	
009	0089_PW374	HDPE (no PTFE)	20 mL	00350019130870	Grey	No	
010	0089_PW378	HDPE (no PTFE)	20 mL	00350019130898	Grey	No	
010	0089_PW378	HDPE (no PTFE)	20 mL	00350019130725	Grey	No	
010	0089_PW378	Clear Plastic Bottle - Natural	250 mL	00071018014824	Green	No	
011	0089_PW411	Clear Plastic Bottle - Natural	250 mL	00071020084201	Green	No	
011	0089_PW411	HDPE (no PTFE)	20 mL	00352010070547	Grey	No	
011	0089_PW411	HDPE (no PTFE)	20 mL	00352010070640	Grey	No	

Total Bottle Count: ALS: 37, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110155**	Page	: 1 of 14
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021 14:15
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27086	Issue Date	: 15-Sep-2021 10:46
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0089_QC301_210901	0089_QC302_210901	0089_QC401_210901	0089_QC402_210901	----
				Sampling date / time	01-Sep-2021 08:55	01-Sep-2021 08:57	01-Sep-2021 08:57	01-Sep-2021 08:58	----
Compound	CAS Number	LOR	Unit		EP2110155-001	EP2110155-002	EP2110155-003	EP2110155-004	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0089_QC301_210901	0089_QC302_210901	0089_QC401_210901	0089_QC402_210901	----
				Sampling date / time	01-Sep-2021 08:55	01-Sep-2021 08:57	01-Sep-2021 08:57	01-Sep-2021 08:58	----
Compound	CAS Number	LOR	Unit		EP2110155-001	EP2110155-002	EP2110155-003	EP2110155-004	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**93.4**	**104**	**98.0**	**91.4**	----
13C8-PFOA	----	0.02	%		**98.7**	**103**	**99.1**	**102**	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW416_210901	0089_SW414_210901	----	----	----
				Sampling date / time	01-Sep-2021 11:48	01-Sep-2021 12:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2110155-008	EP2110155-010	--------	--------	--------
					Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**118**	**116**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**118**	**116**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2300**	**2310**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**18000**	**17600**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**424**	**433**	----	----	----
Magnesium	7439-95-4	1	mg/L		**1360**	**1400**	----	----	----
Sodium	7440-23-5	1	mg/L		**10500**	**10800**	----	----	----
Potassium	7440-09-7	1	mg/L		**548**	**572**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**558**	**547**	----	----	----
ø Total Cations	----	0.01	meq/L		**604**	**621**	----	----	----
ø Ionic Balance	----	0.01	%		**3.94**	**6.36**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW416_210901	0089_SW414_210901	----	----	----
				Sampling date / time	01-Sep-2021 11:48	01-Sep-2021 12:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2110155-008	EP2110155-010	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0089_SW416_210901	0089_SW414_210901	----	----	----
				Sampling date / time	01-Sep-2021 11:48	01-Sep-2021 12:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2110155-008	EP2110155-010	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**105**	**95.8**	----	----	----
13C8-PFOA	----	0.02	%		**101**	**100**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW367_210901	0089_PW368_210901	0089_PW304_210901	0089_PW415_210901	0089_PW413_210901
				Sampling date / time	01-Sep-2021 10:18	01-Sep-2021 10:52	01-Sep-2021 11:03	01-Sep-2021 11:55	01-Sep-2021 12:14
Compound	CAS Number	LOR	Unit		EP2110155-005	EP2110155-006	EP2110155-007	EP2110155-009	EP2110155-011
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		193	123	193	116	113
Total Alkalinity as CaCO3	----	1	mg/L		193	123	193	116	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2250	2300	2110	2310	2280
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17300	17800	16900	17900	17700
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		482	458	437	447	434
Magnesium	7439-95-4	1	mg/L		1320	1460	1270	1430	1400
Sodium	7440-23-5	1	mg/L		10200	11200	9820	11100	10800
Potassium	7440-09-7	1	mg/L		552	599	521	592	575
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		539	552	524	555	549
ø Total Cations	----	0.01	meq/L		590	646	567	638	621
ø Ionic Balance	----	0.01	%		4.58	7.77	3.87	6.92	6.18
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	0.02	0.02	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW367_210901	0089_PW368_210901	0089_PW304_210901	0089_PW415_210901	0089_PW413_210901
				Sampling date / time	01-Sep-2021 10:18	01-Sep-2021 10:52	01-Sep-2021 11:03	01-Sep-2021 11:55	01-Sep-2021 12:14
Compound	CAS Number	LOR	Unit		EP2110155-005	EP2110155-006	EP2110155-007	EP2110155-009	EP2110155-011
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_PW367_210901	0089_PW368_210901	0089_PW304_210901	0089_PW415_210901	0089_PW413_210901
				Sampling date / time	01-Sep-2021 10:18	01-Sep-2021 10:52	01-Sep-2021 11:03	01-Sep-2021 11:55	01-Sep-2021 12:14
Compound	CAS Number	LOR	Unit		EP2110155-005	EP2110155-006	EP2110155-007	EP2110155-009	EP2110155-011
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	**0.02**	**0.02**	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.02**	**0.02**	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.02**	**0.02**	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**88.9**	**101**	**95.1**	**97.3**	**101**
13C8-PFOA	----	0.02	%		**103**	**104**	**99.5**	**103**	**100**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_SW412_210901	----	----	----	----
				Sampling date / time	01-Sep-2021 12:29	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110155-012	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**118**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**118**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2260**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**17700**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**437**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**1410**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**11000**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**578**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**549**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**631**	----	----	----	----
ø Ionic Balance	----	0.01	%		**6.98**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	0089_SW412_210901	----	----	----	----
				Sampling date / time	01-Sep-2021 12:29	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110155-012	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)				Sample ID	**0089_SW412_210901**	----	----	----	----
				Sampling date / time	01-Sep-2021 12:29	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2110155-012**	--------	--------	--------	--------
					Result	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**91.1**	----	----	----	----
13C8-PFOA	----	0.02	%		**97.4**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **RINSATE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110155**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27086	Issue Date	: 15-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3887722)									
EP2110154-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	308	307	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	308	307	0.0	0% - 20%
EP2110154-011	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	121	125	2.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	121	125	2.8	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3883660)									
EP2110154-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1170	1170	0.0	0% - 20%
EP2110154-011	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2290	2320	1.3	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3883659)									
EP2110154-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	7940	7980	0.6	0% - 20%
EP2110154-011	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18100	17600	2.8	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3885396)									
EP2110154-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	208	214	2.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	594	614	3.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	4460	4600	3.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	269	278	3.2	0% - 20%
EP2110154-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	456	461	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1460	1470	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11300	11300	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	604	606	0.3	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3891860)									
EP2110155-005	0089_PW367_210901	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110155-011	0089_PW413_210901	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3891860)									
EP2110155-005	0089_PW367_210901	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110155-011	0089_PW413_210901	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3891860)									
EP2110155-005	0089_PW367_210901	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3891860) - continued									
EP2110155-005	0089_PW367_210901	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110155-011	0089_PW413_210901	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3891860)									
EP2110155-005	0089_PW367_210901	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110155-011	0089_PW413_210901	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3891860)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 3891860) - continued									
EP2110155-005	0089_PW367_210901	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110155-011	0089_PW413_210901	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3887722)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	107	81.2	126
				<1	200 mg/L	100	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3883660)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.3	87.7	113
				<1	500 mg/L	97.2	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3883659)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.6	87.9	114
				<1	1000 mg/L	102	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3885396)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.5	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.9	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.3	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3891860)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	90.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	83.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	99.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	90.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891860)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	97.1	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	117	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	95.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.0	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891860) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3891860)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	108	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	107	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	105	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	107	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	100	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	92.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	94.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3891860)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	94.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	94.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	134	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	121	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3883660)							
EP2110154-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3883659)							
EP2110154-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3891860)							
EP2110155-006	0089_PW368_210901	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	86.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	88.6	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	82.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	82.8	69.0	134

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3891860) - continued							
EP2110155-006	0089_PW368_210901	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	80.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	68.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891860)							
EP2110155-006	0089_PW368_210901	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	77.2	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	92.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	84.4	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	89.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	90.4	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	80.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	77.2	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	77.2	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	86.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	73.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	94.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3891860)							
EP2110155-006	0089_PW368_210901	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	91.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	84.2	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	85.5	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	86.7	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	90.3	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	72.2	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	65.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3891860)							
EP2110155-006	0089_PW368_210901	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	90.2	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	71.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	105	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	72.4	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110155**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 15-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 12
Order number	: DEF19009/730	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2110154--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EP2110154--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0089_PW367_210901,	0089_PW368_210901,	**01-Sep-2021**	**----**	----	----	**07-Sep-2021**	15-Sep-2021	✓
0089_PW304_210901,	0089_SW416_210901,							
0089_PW415_210901,	0089_SW414_210901,							
0089_PW413_210901,	0089_SW412_210901							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0089_PW367_210901,	0089_PW368_210901,	**01-Sep-2021**	**----**	----	----	**14-Sep-2021**	29-Sep-2021	✓
0089_PW304_210901,	0089_SW416_210901,							
0089_PW415_210901,	0089_SW414_210901,							
0089_PW413_210901,	0089_SW412_210901							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0089_PW367_210901,	0089_PW368_210901,	**01-Sep-2021**	**----**	----	----	**14-Sep-2021**	29-Sep-2021	✓
0089_PW304_210901,	0089_SW416_210901,							
0089_PW415_210901,	0089_SW414_210901,							
0089_PW413_210901,	0089_SW412_210901							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0089_PW367_210901,	0089_PW368_210901,	**01-Sep-2021**	**----**	----	----	**07-Sep-2021**	08-Sep-2021	✓
0089_PW304_210901,	0089_SW416_210901,							
0089_PW415_210901,	0089_SW414_210901,							
0089_PW413_210901,	0089_SW412_210901							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_QC301_210901,	0089_QC302_210901,	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
0089_QC401_210901,	0089_QC402_210901,							
0089_PW367_210901,	0089_PW368_210901,							
0089_PW304_210901,	0089_SW416_210901,							
0089_PW415_210901,	0089_SW414_210901,							
0089_PW413_210901,	0089_SW412_210901							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0089_QC301_210901,	0089_QC302_210901,	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
0089_QC401_210901,	0089_QC402_210901,							
0089_PW367_210901,	0089_PW368_210901,							
0089_PW304_210901,	0089_SW416_210901,							
0089_PW415_210901,	0089_SW414_210901,							
0089_PW413_210901,	0089_SW412_210901							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0089_QC301_210901,	0089_QC302_210901,	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
0089_QC401_210901,	0089_QC402_210901,							
0089_PW367_210901,	0089_PW368_210901,							
0089_PW304_210901,	0089_SW416_210901,							
0089_PW415_210901,	0089_SW414_210901,							
0089_PW413_210901,	0089_SW412_210901							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0089_QC301_210901,	0089_QC302_210901,	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
0089_QC401_210901,	0089_QC402_210901,							
0089_PW367_210901,	0089_PW368_210901,							
0089_PW304_210901,	0089_SW416_210901,							
0089_PW415_210901,	0089_SW414_210901,							
0089_PW413_210901,	0089_SW412_210901							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0089_QC301_210901,	0089_QC302_210901,	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
0089_QC401_210901,	0089_QC402_210901,							
0089_PW367_210901,	0089_PW368_210901,							
0089_PW304_210901,	0089_SW416_210901,							
0089_PW415_210901,	0089_SW414_210901,							
0089_PW413_210901,	0089_SW412_210901							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110155**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27086	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted] [redacted]		

Dates

Date Samples Received	: 02-Sep-2021 14:15	Issue Date	: 03-Sep-2021
Client Requested Due Date	: 15-Sep-2021	Scheduled Reporting Date	: **15-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 16.8 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110155-001	01-Sep-2021 08:55	0089_QC301_210901		✓		
EP2110155-002	01-Sep-2021 08:57	0089_QC302_210901		✓		
EP2110155-003	01-Sep-2021 08:57	0089_QC401_210901		✓		
EP2110155-004	01-Sep-2021 08:58	0089_QC402_210901		✓		
EP2110155-005	01-Sep-2021 10:18	0089_PW367_210901	✓	✓	✓	✓
EP2110155-006	01-Sep-2021 10:52	0089_PW368_210901	✓	✓	✓	✓
EP2110155-007	01-Sep-2021 11:03	0089_PW304_210901	✓	✓	✓	✓
EP2110155-008	01-Sep-2021 11:48	0089_SW416_210901	✓	✓	✓	✓
EP2110155-009	01-Sep-2021 11:55	0089_PW415_210901	✓	✓	✓	✓
EP2110155-010	01-Sep-2021 12:08	0089_SW414_210901	✓	✓	✓	✓
EP2110155-011	01-Sep-2021 12:14	0089_PW413_210901	✓	✓	✓	✓
EP2110155-012	01-Sep-2021 12:29	0089_SW412_210901	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) Email [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) Email [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]
- Chain of Custody (CoC) (COC) Email [redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]
- EDI Format - XTab (XTAB) Email [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2110155

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno

Project Manager: [redacted]

ALS Compass COC Reference: #27086,27088 #27107, 27085, 27087, 27093 **# Samples:** 2 eskies

Phone: [redacted]

Sampler: [redacted]

Phone: [redacted]

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send Eurofins Trip to their lab (QC21?)

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 01/09/21 . 5pm	Date / Time: 2/9 1415	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: **27086** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinsate WATER	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_QC301		01/09/2021 08:55 AM	Water	ALS: 2 Non ALS: 0	No	X			
002	0089_QC302		01/09/2021 08:57 AM	Water	ALS: 2 Non ALS: 0	No	X			
003	0089_QC401		01/09/2021 08:57 AM	Water	ALS: 2 Non ALS: 0	No	X			
004	0089_QC402		01/09/2021 08:58 AM	Water	ALS: 2 Non ALS: 0	No	X			
005	0089_PW367		01/09/2021 10:18 AM	Water	ALS: 5 Non ALS: 0	No		Partial 4/8		Extra PFAS lab QAQC samples collected
006	0089_PW368		01/09/2021 10:52 AM	Water	ALS: 5 Non ALS: 0	No		Partial 4/8		Extra PFAS lab QAQC samples collected
007	0089_PW304		01/09/2021 11:03 AM	Water	ALS: 3 Non ALS: 0	No		Partial 4/8		
008	0089_SW416		01/09/2021 11:48 AM	Water	ALS: 6 Non ALS: 0	No		Partial 4/8		Extra PFAS lab QAQC samples collected
009	0089_PW415		01/09/2021 11:55 AM	Water	ALS: 6 Non ALS: 0	No		Partial 4/8		Extra PFAS lab QAQC samples collected

CHAIN OF CUSTODY

(ALS) COC#: **27086** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinsate WATER	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0089_SW414		01/09/2021 12:08 PM	Water	ALS: 3 Non ALS: 0	No		Partial 4/8		
011	0089_PW413		01/09/2021 12:14 PM	Water	ALS: 6 Non ALS: 0	No		Partial 4/8		Extra PFAS lab QAQC samples collected
012	0089_SW412		01/09/2021 12:29 PM	Water	ALS: 3 Non ALS: 0	No		Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 27086 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
005	0089_PW367	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0089_PW368	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0089_PW304	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0089_SW416	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0089_PW415	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0089_SW414	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
011	0089_PW413	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
012	0089_SW412	Surface Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 27086 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_QC301	HDPE (no PTFE)	20 mL	00350019025048	Grey	No	
001	0089_QC301	HDPE (no PTFE)	20 mL	00350019047362	Grey	No	
002	0089_QC302	HDPE (no PTFE)	20 mL	00350019025033	Grey	No	
002	0089_QC302	HDPE (no PTFE)	20 mL	00350019025020	Grey	No	
003	0089_QC401	HDPE (no PTFE)	20 mL	00350019024980	Grey	No	
003	0089_QC401	HDPE (no PTFE)	20 mL	00350019024977	Grey	No	
004	0089_QC402	HDPE (no PTFE)	20 mL	00350019047366	Grey	No	
004	0089_QC402	HDPE (no PTFE)	20 mL	00350019024983	Grey	No	
005	0089_PW367	Clear Plastic Bottle - Natural	250 mL	00071018014770	Green	No	
005	0089_PW367	HDPE (no PTFE)	20 mL	00350019150819	Grey	No	
005	0089_PW367	HDPE (no PTFE)	20 mL	00350019151384	Grey	No	
005	0089_PW367	HDPE (no PTFE)	20 mL	00350019151443	Grey	No	
005	0089_PW367	HDPE (no PTFE)	20 mL	00350019151165	Grey	No	
006	0089_PW368	Clear Plastic Bottle - Natural	250 mL	00071018014779	Green	No	
006	0089_PW368	HDPE (no PTFE)	20 mL	00350019151169	Grey	No	
006	0089_PW368	HDPE (no PTFE)	20 mL	00350019130924	Grey	No	
006	0089_PW368	HDPE (no PTFE)	20 mL	00350019151268	Grey	No	
006	0089_PW368	HDPE (no PTFE)	20 mL	00350019130927	Grey	No	
007	0089_PW304	Clear Plastic Bottle - Natural	250 mL	00071018014783	Green	No	
007	0089_PW304	HDPE (no PTFE)	20 mL	00350019151603	Grey	No	
007	0089_PW304	HDPE (no PTFE)	20 mL	00350019151593	Grey	No	
008	0089_SW416	HDPE (no PTFE)	20 mL	00350019151012	Grey	No	
008	0089_SW416	HDPE (no PTFE)	20 mL	00350019151010	Grey	No	
008	0089_SW416	HDPE (no PTFE)	20 mL	00350019150757	Grey	No	
008	0089_SW416	HDPE (no PTFE)	20 mL	00350019150758	Grey	No	
008	0089_SW416	Clear Plastic Bottle - Natural	250 mL	00070220025237	Green	No	

CHAIN OF CUSTODY

ALS COC#: 27086 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SW/PW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

008	0089_SW416	Clear Plastic Bottle - Natural	250 mL	00070220024927	Green	No	
009	0089_PW415	Clear Plastic Bottle - Natural	250 mL	00070220025073	Green	No	
009	0089_PW415	Clear Plastic Bottle - Natural	250 mL	00070220025036	Green	No	
009	0089_PW415	HDPE (no PTFE)	20 mL	00352101017278	Grey	No	
009	0089_PW415	HDPE (no PTFE)	20 mL	00352101017129	Grey	No	
009	0089_PW415	HDPE (no PTFE)	20 mL	00350019151173	Grey	No	
009	0089_PW415	HDPE (no PTFE)	20 mL	00350019151118	Grey	No	
010	0089_SW414	Clear Plastic Bottle - Natural	250 mL	00071018014723	Green	No	
010	0089_SW414	HDPE (no PTFE)	20 mL	00350019130817	Grey	No	
010	0089_SW414	HDPE (no PTFE)	20 mL	00350019130874	Grey	No	
011	0089_PW413	Clear Plastic Bottle - Natural	250 mL	00070220025018	Green	No	
011	0089_PW413	Clear Plastic Bottle - Natural	250 mL	00070220025077	Green	No	
011	0089_PW413	HDPE (no PTFE)	20 mL	00350019150867	Grey	No	
011	0089_PW413	HDPE (no PTFE)	20 mL	00350019151216	Grey	No	
011	0089_PW413	HDPE (no PTFE)	20 mL	00350019150955	Grey	No	
011	0089_PW413	HDPE (no PTFE)	20 mL	00350019150927	Grey	No	
012	0089_SW412	Clear Plastic Bottle - Natural	250 mL	00071018014730	Green	No	
012	0089_SW412	HDPE (no PTFE)	20 mL	00350019151412	Grey	No	
012	0089_SW412	HDPE (no PTFE)	20 mL	00350019151612	Grey	No	

Total Bottle Count: ALS: 45, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110156**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021 14:15
Order number	: DEF19009/730	Date Analysis Commenced	: 11-Sep-2021
C-O-C number	: 27087	Issue Date	: 15-Sep-2021 08:52
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X: Positive result for analyte Perfluorooctane sulfonic acid (PFOS) on sample EP2110156_003,005,006 has been confirmed by re-extraction and re-analysis.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD369_210901	0089_SD345_210901	0089_SD367_210901	0089_SD374_210901	0089_SD378_210901
			Sampling date / time	01-Sep-2021 09:54	01-Sep-2021 10:10	01-Sep-2021 10:23	01-Sep-2021 11:40	01-Sep-2021 11:40
Compound	CAS Number	LOR	Unit	EP2110156-001	EP2110156-002	EP2110156-003	EP2110156-004	EP2110156-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**27.4**	**30.5**	**28.2**	**18.9**	**20.0**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**0.0005**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	0089_SD369_210901	0089_SD345_210901	0089_SD367_210901	0089_SD374_210901	0089_SD378_210901
				Sampling date / time	01-Sep-2021 09:54	01-Sep-2021 10:10	01-Sep-2021 10:23	01-Sep-2021 11:40	01-Sep-2021 11:40
					EP2110156-001	EP2110156-002	EP2110156-003	EP2110156-004	EP2110156-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0005**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0005**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0005**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**110**	**105**	**88.0**	**110**	**92.0**
13C8-PFOA	----	0.0002	%		**112**	**106**	**116**	**118**	**114**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD375_210901	0089_SD411_210901	----	----	----
			Sampling date / time	01-Sep-2021 11:40	01-Sep-2021 12:30	----	----	----
Compound	CAS Number	LOR	Unit	EP2110156-006	EP2110156-007	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**18.8**	**22.9**	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0004**	<0.0002	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD375_210901	0089_SD411_210901	----	----	----
				Sampling date / time	01-Sep-2021 11:40	01-Sep-2021 12:30	----	----	----
Compound	CAS Number	LOR	Unit		EP2110156-006	EP2110156-007	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0004**	<0.0002	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0004**	<0.0002	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0004**	<0.0002	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**91.5**	**106**	----	----	----
13C8-PFOA	----	0.0002	%		**108**	**111**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110156**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 11-Sep-2021
C-O-C number	: 27087	Issue Date	: 15-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3897310)									
EP2110156-003	0089_SD367_210901	EA055: Moisture Content	----	0.1	%	28.2	27.5	2.5	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3897923)									
EP2110156-001	0089_SD369_210901	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2110157-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3897923)									
EP2110156-001	0089_SD369_210901	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3897923) - continued									
EP2110156-001	0089_SD369_210901	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2110157-004	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3897923)									
EP2110156-001	0089_SD369_210901	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110157-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3897923)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3897923) - continued									
EP2110156-001	0089_SD369_210901	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110157-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3897923)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3897923)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	84.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.0	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	111	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3897923)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	112	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	83.8	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3897923)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	96.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	107	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3897923) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	91.6	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3897923)							
EP2110156-001	0089_SD369_210901	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	110	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	116	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	106	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	110	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	104	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	116	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3897923)							
EP2110156-001	0089_SD369_210901	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	97.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	115	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	111	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	120	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	120	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	106	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	108	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	110	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	117	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	116	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	129	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3897923)							
EP2110156-001	0089_SD369_210901	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	120	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	123	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	124	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	110	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	102	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	110	63.0	144

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3897923) - continued							
EP2110156-001	0089_SD369_210901	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	99.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3897923)							
EP2110156-001	0089_SD369_210901	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	112	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	100	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	108	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	112	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110156**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 15-Sep-2021
Sampler	: [redacted]	No. of samples received	: 7
Order number	: DEF19009/730	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Moisture Content	1	11	9.09	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
0089_SD369_210901, 0089_SD345_210901, 0089_SD367_210901, 0089_SD374_210901, 0089_SD378_210901, 0089_SD375_210901, 0089_SD411_210901	**01-Sep-2021**	**----**	----	----	**11-Sep-2021**	15-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD369_210901, 0089_SD345_210901, 0089_SD367_210901, 0089_SD374_210901, 0089_SD378_210901, 0089_SD375_210901, 0089_SD411_210901	**01-Sep-2021**	**13-Sep-2021**	28-Feb-2022	✓	**13-Sep-2021**	23-Oct-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD369_210901, 0089_SD345_210901, 0089_SD367_210901, 0089_SD374_210901, 0089_SD378_210901, 0089_SD375_210901, 0089_SD411_210901	**01-Sep-2021**	**13-Sep-2021**	28-Feb-2022	✓	**13-Sep-2021**	23-Oct-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD369_210901, 0089_SD345_210901, 0089_SD367_210901, 0089_SD374_210901, 0089_SD378_210901, 0089_SD375_210901, 0089_SD411_210901	**01-Sep-2021**	**13-Sep-2021**	28-Feb-2022	✓	**13-Sep-2021**	23-Oct-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD369_210901, 0089_SD345_210901, 0089_SD367_210901, 0089_SD374_210901, 0089_SD378_210901, 0089_SD375_210901, 0089_SD411_210901	**01-Sep-2021**	**13-Sep-2021**	28-Feb-2022	✓	**13-Sep-2021**	23-Oct-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD369_210901, 0089_SD345_210901, 0089_SD367_210901, 0089_SD374_210901, 0089_SD378_210901, 0089_SD375_210901, 0089_SD411_210901	**01-Sep-2021**	**13-Sep-2021**	28-Feb-2022	✓	**13-Sep-2021**	23-Oct-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	11	**9.09**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110156**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27087	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 02-Sep-2021 14:15	Issue Date	: 03-Sep-2021
Client Requested Due Date	: 15-Sep-2021	Scheduled Reporting Date	: **15-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 16.8 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2110156-001	01-Sep-2021 09:54	0089_SD369_210901	✓	✓
EP2110156-002	01-Sep-2021 10:10	0089_SD345_210901	✓	✓
EP2110156-003	01-Sep-2021 10:23	0089_SD367_210901	✓	✓
EP2110156-004	01-Sep-2021 11:40	0089_SD374_210901	✓	✓
EP2110156-005	01-Sep-2021 11:40	0089_SD378_210901	✓	✓
EP2110156-006	01-Sep-2021 11:40	0089_SD375_210901	✓	✓
EP2110156-007	01-Sep-2021 12:30	0089_SD411_210901	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2110156

Telephone : -- 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno **Project Manager:** [redacted]

#27107, 27085, 27087, 27093

ALS Compass COC Reference: #27086, 27088 **# Samples:** 2 eskies **Phone:**

Sampler: [redacted]

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send Eurofins Trip to their lab (QC218)

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time:	**Date / Time:**	**Date / Time:**	**Date / Time:**
01/09/21, 5pm	2/9 1415		

CHAIN OF CUSTODY

COC#: **27087** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD369		01/09/2021 09:54 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
002	0089_SD345		01/09/2021 10:10 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
003	0089_SD367		01/09/2021 10:23 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
004	0089_SD374		01/09/2021 11:40 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
005	0089_SD378		01/09/2021 11:40 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
006	0089_SD375		01/09/2021 11:40 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
007	0089_SD411		01/09/2021 12:30 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		

CHAIN OF CUSTODY

ALS COC#: 27087 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SD369	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
002	0089_SD345	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
003	0089_SD367	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
004	0089_SD374	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
005	0089_SD378	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
006	0089_SD375	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
007	0089_SD411	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 27087 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC- DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD369	HDPE Soil Jar	200 mL	00621019025050	Grey	No	
002	0089_SD345	HDPE Soil Jar	200 mL	00621019025137	Grey	No	
003	0089_SD367	HDPE Soil Jar	200 mL	00621019025070	Grey	No	
004	0089_SD374	HDPE Soil Jar	200 mL	00621019025108	Grey	No	
005	0089_SD378	HDPE Soil Jar	200 mL	00621019025103	Grey	No	
006	0089_SD375	HDPE Soil Jar	200 mL	00621019025012	Grey	No	
007	0089_SD411	HDPE Soil Jar	200 mL	00621019025094	Grey	No	

Total Bottle Count: ALS: 7, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110157**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021 14:15
Order number	: DEF19009/730	Date Analysis Commenced	: 11-Sep-2021
C-O-C number	: 27088	Issue Date	: 15-Sep-2021 08:52
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X: Positive result for analyte Perfluorooctane sulfonic acid (PFOS) on sample EP2110157_001 has been confirmed by re-extraction and re-analysis.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	0089_SD368_210901	0089_SD304_210901	0089_SD415_210901	0089_SD413_210901	----
			Sampling date / time	01-Sep-2021 10:58	01-Sep-2021 11:10	01-Sep-2021 12:02	01-Sep-2021 12:23	----
Compound	CAS Number	LOR	Unit	EP2110157-001	EP2110157-002	EP2110157-003	EP2110157-004	--------
				Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**29.7**	**26.6**	**9.6**	**20.4**	**----**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0006**	<0.0002	<0.0002	<0.0002	**----**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	**----**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	**----**
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**----**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	**----**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0089_SD368_210901	0089_SD304_210901	0089_SD415_210901	0089_SD413_210901	----
				Sampling date / time	01-Sep-2021 10:58	01-Sep-2021 11:10	01-Sep-2021 12:02	01-Sep-2021 12:23	----
Compound	CAS Number	LOR	Unit		EP2110157-001	EP2110157-002	EP2110157-003	EP2110157-004	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0006**	<0.0002	<0.0002	<0.0002	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0006**	<0.0002	<0.0002	<0.0002	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0006**	<0.0002	<0.0002	<0.0002	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**78.5**	**92.0**	**110**	**111**	----
13C8-PFOA	----	0.0002	%		**119**	**111**	**110**	**120**	----

Surrogate Control Limits

Sub-Matrix: **SEDIMENT**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110157**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 11-Sep-2021
C-O-C number	: 27088	Issue Date	: 15-Sep-2021
Sampler	: [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3897310)									
EP2110156-003	Anonymous	EA055: Moisture Content	----	0.1	%	28.2	27.5	2.5	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3897923)									
EP2110156-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2110157-004	0089_SD413_210901	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3897923)									
EP2110156-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3897923) - continued									
EP2110156-001	Anonymous	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2110157-004	0089_SD413_210901	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3897923)									
EP2110156-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110157-004	0089_SD413_210901	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3897923)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3897923) - continued									
EP2110156-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2110157-004	0089_SD413_210901	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3897923)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3897923)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	84.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.0	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	111	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3897923)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	112	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	83.8	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3897923)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	96.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	107	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3897923) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	91.6	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3897923)							
EP2110156-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	110	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	116	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	106	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	110	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	104	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	116	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3897923)							
EP2110156-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	97.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	115	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	111	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	120	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	120	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	106	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	108	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	110	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	117	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	116	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	129	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3897923)							
EP2110156-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	120	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	123	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	124	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	110	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	102	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	110	63.0	144

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3897923) - continued							
EP2110156-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	99.2	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3897923)							
EP2110156-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	112	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	100	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	108	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	112	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110157**	Page	: 1 of 4
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 15-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 4
Order number	: DEF19009/730	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Moisture Content	1	11	9.09	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
0089_SD368_210901, 0089_SD304_210901, 0089_SD415_210901, 0089_SD413_210901	**01-Sep-2021**	**----**	----	----	**11-Sep-2021**	15-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD368_210901, 0089_SD304_210901, 0089_SD415_210901, 0089_SD413_210901	**01-Sep-2021**	**13-Sep-2021**	28-Feb-2022	✓	**13-Sep-2021**	23-Oct-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0089_SD368_210901, 0089_SD304_210901, 0089_SD415_210901, 0089_SD413_210901	**01-Sep-2021**	**13-Sep-2021**	28-Feb-2022	✓	**13-Sep-2021**	23-Oct-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0089_SD368_210901, 0089_SD304_210901, 0089_SD415_210901, 0089_SD413_210901	**01-Sep-2021**	**13-Sep-2021**	28-Feb-2022	✓	**13-Sep-2021**	23-Oct-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0089_SD368_210901, 0089_SD304_210901, 0089_SD415_210901, 0089_SD413_210901	**01-Sep-2021**	**13-Sep-2021**	28-Feb-2022	✓	**13-Sep-2021**	23-Oct-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0089_SD368_210901, 0089_SD304_210901, 0089_SD415_210901, 0089_SD413_210901	**01-Sep-2021**	**13-Sep-2021**	28-Feb-2022	✓	**13-Sep-2021**	23-Oct-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	11	**9.09**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110157**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27088	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 02-Sep-2021 14:15	Issue Date	: 03-Sep-2021
Client Requested Due Date	: 15-Sep-2021	Scheduled Reporting Date	: **15-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 16.8 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2110157-001	01-Sep-2021 10:58	0089_SD368_210901	✓	✓
EP2110157-002	01-Sep-2021 11:10	0089_SD304_210901	✓	✓
EP2110157-003	01-Sep-2021 12:02	0089_SD415_210901	✓	✓
EP2110157-004	01-Sep-2021 12:23	0089_SD413_210901	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2110157

Telephone : – 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno

Project Manager: [redacted]

Phone:

ALS Compass COC Reference: #27086, 27088, 27107, 27085, 27037, 27093 **# Samples:** 2 eskies

Sampler: [redacted]

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send Eurofins Trip to their lab (QC218)

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time: 01/09/21, 5pm	Date / Time: 2/9 1415	Date / Time:	Date / Time:

CHAIN OF CUSTODY

COC#: **27088** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_SD368		01/09/2021 10:58 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
002	0089_SD304		01/09/2021 11:10 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
003	0089_SD415		01/09/2021 12:02 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
004	0089_SD413		01/09/2021 12:23 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		

CHAIN OF CUSTODY

COC#: **27088** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_SD368	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
002	0089_SD304	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
003	0089_SD415	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
004	0089_SD413	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 27088 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling SED

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_SD368	HDPE Soil Jar	200 mL	00621019025018	Grey	No	
002	0089_SD304	HDPE Soil Jar	200 mL	00621019024997	Grey	No	
003	0089_SD415	HDPE Soil Jar	200 mL	00621019025044	Grey	No	
004	0089_SD413	HDPE Soil Jar	200 mL	00621019025131	Grey	No	

Total Bottle Count: ALS: 4, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110159**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021 14:15
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27093	Issue Date	: 13-Sep-2021 12:05
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW197_210901	0089_MW200_210901	0089_MW215_210901	0089_MW214_210901	----
				Sampling date / time	01-Sep-2021 10:43	01-Sep-2021 10:44	01-Sep-2021 13:13	01-Sep-2021 13:48	----
Compound	CAS Number	LOR	Unit		EP2110159-001	EP2110159-002	EP2110159-003	EP2110159-004	--------
					Result	Result	Result	Result	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**1140**	**462**	**324**	**558**	----
Total Alkalinity as CaCO3	----	1	mg/L		**1140**	**462**	**324**	**558**	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**378**	**244**	**59**	**14**	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1490**	**1950**	**229**	**721**	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**67**	**104**	**116**	**206**	----
Magnesium	7439-95-4	1	mg/L		**324**	**119**	**27**	**52**	----
Sodium	7440-23-5	1	mg/L		**880**	**1270**	**100**	**283**	----
Potassium	7440-09-7	1	mg/L		**91**	**74**	**5**	**9**	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**72.7**	**69.3**	**14.2**	**31.8**	----
ø Total Cations	----	0.01	meq/L		**70.6**	**72.1**	**12.5**	**27.1**	----
ø Ionic Balance	----	0.01	%		**1.44**	**1.98**	**6.28**	**7.95**	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	**0.03**	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	**0.03**	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	**0.35**	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW197_210901	0089_MW200_210901	0089_MW215_210901	0089_MW214_210901	----
				Sampling date / time	01-Sep-2021 10:43	01-Sep-2021 10:44	01-Sep-2021 13:13	01-Sep-2021 13:48	----
Compound	CAS Number	LOR	Unit		EP2110159-001	EP2110159-002	EP2110159-003	EP2110159-004	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW197_210901	0089_MW200_210901	0089_MW215_210901	0089_MW214_210901	----
				Sampling date / time	01-Sep-2021 10:43	01-Sep-2021 10:44	01-Sep-2021 13:13	01-Sep-2021 13:48	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2110159-001**	**EP2110159-002**	**EP2110159-003**	**EP2110159-004**	**--------**
					Result	Result	Result	Result	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**----**
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	**0.41**	<0.01	**----**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.35**	<0.01	**----**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.38**	<0.01	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.2**	**93.7**	**97.7**	**100**	**----**
13C8-PFOA	----	0.02	%		**102**	**101**	**101**	**101**	**----**

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110159**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27093	Issue Date	: 13-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3887855)									
EP2110159-002	0089_MW200_210901	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	462	461	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	462	461	0.0	0% - 20%
EP2110227-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	93	92	1.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	93	92	1.8	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3883656)									
EP2110159-001	0089_MW197_210901	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	378	380	0.5	0% - 20%
EP2110324-009	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2740	2840	3.7	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3883655)									
EP2110159-001	0089_MW197_210901	ED045G: Chloride	16887-00-6	1	mg/L	1490	1440	3.7	0% - 20%
EP2110324-009	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	26000	24600	5.6	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3885396)									
EP2110154-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	208	214	2.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	594	614	3.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	4460	4600	3.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	269	278	3.2	0% - 20%
EP2110154-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	456	461	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1460	1470	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11300	11300	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	604	606	0.3	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED093F: Dissolved Major Cations (QC Lot: 3885397)									
EP2110159-002	0089_MW200_210901	ED093F: Calcium	7440-70-2	1	mg/L	104	104	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	119	119	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1270	1280	0.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	74	73	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3891756)									
EP2110350-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	4.33	4.39	1.5	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.10	0.09	10.2	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.10	0.10	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.20	1.25	4.3	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.11	0.11	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110159-004	0089_MW214_210901	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3891756)									
EP2110350-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.14	0.13	0.0	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.08	0.08	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.48	0.47	2.4	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110159-004	0089_MW214_210901	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3891756)									
EP2110350-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.04	0.03	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110159-004	0089_MW214_210901	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3891756)									
EP2110350-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.09	0.10	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.14	0.11	25.9	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110159-004	0089_MW214_210901	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3891756) - continued									
EP2110159-004	0089_MW214_210901	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3891756)									
EP2110350-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	6.86	6.91	0.7	0% - 20%
EP2110159-004	0089_MW214_210901	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3887855)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	105	81.2	126
				<1	200 mg/L	101	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3883656)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.9	87.7	113
				<1	500 mg/L	101	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3883655)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	91.5	87.9	114
				<1	1000 mg/L	106	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3885396)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.5	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.9	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.3	89.7	108
ED093F: Dissolved Major Cations (QCLot: 3885397)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.1	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.6	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.5	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3891756)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	87.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	97.4	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	83.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	92.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	88.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891756)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	84.9	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	87.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	88.8	72.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891756) - continued								
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	94.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	81.6	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	82.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	78.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	88.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	81.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	97.4	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3891756)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	97.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	79.5	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	88.3	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	88.8	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	78.7	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	80.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	68.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3891756)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	94.0	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	102	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	92.2	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	89.6	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3883656)							
EP2110159-001	0089_MW197_210901	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	116	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3883655)							
EP2110159-001	0089_MW197_210901	ED045G: Chloride	16887-00-6	1000 mg/L	89.8	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3891756)							
EP2110159-002	0089_MW200_210901	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	91.0	72.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3891756) - continued							
EP2110159-002	0089_MW200_210901	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	99.8	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	87.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	95.2	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	87.6	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891756)							
EP2110159-002	0089_MW200_210901	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	82.0	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	95.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	90.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	95.6	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	101	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	83.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	84.2	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	77.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	93.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	86.6	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3891756)							
EP2110159-002	0089_MW200_210901	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	84.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	84.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	84.6	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	104	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	78.4	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	91.6	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	74.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3891756)							
EP2110159-002	0089_MW200_210901	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	92.0	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	79.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	112	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	105	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110159**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 13-Sep-2021
Sampler	: [redacted] [redacted]	No. of samples received	: 4
Order number	: DEF19009/730	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW197_210901, 0089_MW200_210901, 0089_MW215_210901, 0089_MW214_210901	**01-Sep-2021**	**----**	----	----	**07-Sep-2021**	15-Sep-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW197_210901, 0089_MW200_210901, 0089_MW215_210901, 0089_MW214_210901	**01-Sep-2021**	**----**	----	----	**10-Sep-2021**	29-Sep-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW197_210901, 0089_MW200_210901, 0089_MW215_210901, 0089_MW214_210901	**01-Sep-2021**	**----**	----	----	**10-Sep-2021**	29-Sep-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW197_210901, 0089_MW200_210901, 0089_MW215_210901, 0089_MW214_210901	**01-Sep-2021**	**----**	----	----	**07-Sep-2021**	08-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW197_210901, 0089_MW200_210901, 0089_MW215_210901, 0089_MW214_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW197_210901, 0089_MW200_210901, 0089_MW215_210901, 0089_MW214_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW197_210901, 0089_MW200_210901, 0089_MW215_210901, 0089_MW214_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW197_210901, 0089_MW200_210901, 0089_MW215_210901, 0089_MW214_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW197_210901, 0089_MW200_210901, 0089_MW215_210901, 0089_MW214_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110159**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27093	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 02-Sep-2021 14:15	Issue Date	: 03-Sep-2021
Client Requested Due Date	: 15-Sep-2021	Scheduled Reporting Date	: **15-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 16.8 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110159-001	01-Sep-2021 10:43	0089_MW197_210901	✓	✓	✓	✓
EP2110159-002	01-Sep-2021 10:44	0089_MW200_210901	✓	✓	✓	✓
EP2110159-003	01-Sep-2021 13:13	0089_MW215_210901	✓	✓	✓	✓
EP2110159-004	01-Sep-2021 13:48	0089_MW214_210901	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2110159

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: DEF19009 **Client:** Cardno

#27107, 27085, 27087, 27093

ALS Compass COC Reference: ~~#27086, 27088~~ **# Samples:** 2 eskies

Project Manager: [redacted]
Phone:
Sampler:
Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:
Please send Eurofins Trip to their lab (QC218)

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time:	**Date / Time:**	**Date / Time:**	**Date / Time:**
01/02/21 . 5pm	2/9 1415		

CHAIN OF CUSTODY

ALS COC#: 27093 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW197		01/09/2021 10:43 AM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8		
002	0089_MW200		01/09/2021 10:44 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC samples collected
003	0089_MW215		01/09/2021 01:13 PM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC samples collected
004	0089_MW214		01/09/2021 01:48 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS lab QAQC samples collected

CHAIN OF CUSTODY

COC#: **27093** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW197	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0089_MW200	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0089_MW215	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0089_MW214	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 27093 ALS Laboratory: EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: CG_DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW197	Clear Plastic Bottle - Natural	250 mL	00070220025235	Green	No	
001	0089_MW197	Clear Plastic Bottle - Natural	250 mL	00070220025191	Green	No	
001	0089_MW197	HDPE (no PTFE)	20 mL	00350019151064	Grey	No	
001	0089_MW197	HDPE (no PTFE)	20 mL	00350019150930	Grey	No	
002	0089_MW200	Clear Plastic Bottle - Natural	250 mL	00071018014736	Green	No	
002	0089_MW200	HDPE (no PTFE)	20 mL	00350019151481	Grey	No	
002	0089_MW200	HDPE (no PTFE)	20 mL	00350019151076	Grey	No	
002	0089_MW200	HDPE (no PTFE)	20 mL	00350019151635	Grey	No	
002	0089_MW200	HDPE (no PTFE)	20 mL	00350019151148	Grey	No	
003	0089_MW215	HDPE (no PTFE)	20 mL	00350019151171	Grey	No	
003	0089_MW215	HDPE (no PTFE)	20 mL	00350019150881	Grey	No	
003	0089_MW215	HDPE (no PTFE)	20 mL	00350019151142	Grey	No	
003	0089_MW215	HDPE (no PTFE)	20 mL	00350019151233	Grey	No	
003	0089_MW215	Clear Plastic Bottle - Natural	250 mL	00070220025249	Green	No	
003	0089_MW215	Clear Plastic Bottle - Natural	250 mL	00070220025204	Green	No	
004	0089_MW214	Clear Plastic Bottle - Natural	250 mL	00071018014765	Green	No	
004	0089_MW214	HDPE (no PTFE)	20 mL	00350019130881	Grey	No	
004	0089_MW214	HDPE (no PTFE)	20 mL	00350019151179	Grey	No	
004	0089_MW214	HDPE (no PTFE)	20 mL	00350019130841	Grey	No	
004	0089_MW214	HDPE (no PTFE)	20 mL	00350019151022	Grey	No	

Total Bottle Count: ALS: 20, Non ALS: 0

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2110160**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021 14:15
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27107	Issue Date	: 15-Sep-2021 10:44
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 1		
No. of samples analysed	: 1		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the Chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW225_210901	----	----	----	----
				Sampling date / time	01-Sep-2021 13:08	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110160-001	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**302**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**302**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**58**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**522**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**134**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**39**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**196**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**8**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**22.0**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**18.6**	----	----	----	----
ø Ionic Balance	----	0.01	%		**8.23**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW225_210901	----	----	----	----
				Sampling date / time	01-Sep-2021 13:08	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110160-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0089_MW225_210901	----	----	----	----
				Sampling date / time	01-Sep-2021 13:08	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2110160-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**93.2**	----	----	----	----
13C8-PFOA	----	0.02	%		**98.0**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2110160**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Order number	: DEF19009/730	Date Analysis Commenced	: 07-Sep-2021
C-O-C number	: 27107	Issue Date	: 15-Sep-2021
Sampler	: [redacted] [redacted]		
Site	: DEF19009/Stirling		
Quote number	: SY/139/19		
No. of samples received	: 1		
No. of samples analysed	: 1		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
[redacted]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[redacted]	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3887855)									
EP2110159-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	462	461	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	462	461	0.0	0% - 20%
EP2110227-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	93	92	1.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	93	92	1.8	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3895637)									
EP2110160-001	0089_MW225_210901	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	58	58	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3895636)									
EP2110160-001	0089_MW225_210901	ED045G: Chloride	16887-00-6	1	mg/L	522	527	0.8	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3885397)									
EP2110159-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	104	104	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	119	119	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1270	1280	0.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	74	73	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3891860)									
EP2110155-005	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3891860) - continued									
EP2110155-005	Anonymous	EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2110155-011	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3891860)									
EP2110155-005	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2110155-011	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3891860)									
EP2110155-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3891860) - continued									
EP2110155-005	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110155-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3891860)									
EP2110155-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2110155-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 3891860)									
EP2110155-005	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2110155-011	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3887855)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	105	81.2	126
				<1	200 mg/L	101	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3895637)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.7	87.7	113
				<1	500 mg/L	100	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3895636)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.7	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3885397)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.1	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.6	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.5	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3891860)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	90.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	83.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	99.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	90.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891860)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	97.1	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	107	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	117	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	95.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.0	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891860) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3891860)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	108	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	107	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	105	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	107	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	100	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	92.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	94.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3891860)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	94.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	94.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	134	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	121	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3895637)							
EP2110160-001	0089_MW225_210901	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	99.3	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3895636)							
EP2110160-001	0089_MW225_210901	ED045G: Chloride	16887-00-6	1000 mg/L	86.6	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3891860)							
EP2110155-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	86.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	88.6	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	82.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	82.8	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	80.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	68.4	53.0	142

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3891860)							
EP2110155-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	77.2	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	92.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	84.4	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	89.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	90.4	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	80.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	77.2	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	77.2	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	86.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	73.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	94.2	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3891860)							
EP2110155-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	91.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	84.2	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	85.5	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	86.7	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	90.3	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	72.2	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	65.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3891860)							
EP2110155-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	90.2	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	71.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	105	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	72.4	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2110160**	Page	: 1 of 4
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: [redacted]
Project	: WA_0089_PFASOMP	Date Samples Received	: 02-Sep-2021
Site	: DEF19009/Stirling	Issue Date	: 15-Sep-2021
Sampler	: [redacted]	No. of samples received	: 1
Order number	: DEF19009/730	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0089_MW225_210901	**01-Sep-2021**	**----**	----	----	**07-Sep-2021**	15-Sep-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0089_MW225_210901	**01-Sep-2021**	**----**	----	----	**13-Sep-2021**	29-Sep-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0089_MW225_210901	**01-Sep-2021**	**----**	----	----	**13-Sep-2021**	29-Sep-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0089_MW225_210901	**01-Sep-2021**	**----**	----	----	**07-Sep-2021**	08-Sep-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW225_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW225_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0089_MW225_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0089_MW225_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0089_MW225_210901	**01-Sep-2021**	**09-Sep-2021**	28-Feb-2022	✓	**09-Sep-2021**	28-Feb-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	9	**22.22**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2110160**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: [redacted]
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]	E-mail	: [redacted]alsglobal.com
Telephone	: ----	Telephone	: [redacted]
Facsimile	: ----	Facsimile	: [redacted]
Project	: WA_0089_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/730	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 27107	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/Stirling		
Sampler	: [redacted]		

Dates

Date Samples Received	: 02-Sep-2021 14:15	Issue Date	: 03-Sep-2021
Client Requested Due Date	: 15-Sep-2021	Scheduled Reporting Date	: **15-Sep-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 16.8 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2110160-001	01-Sep-2021 13:08	0089_MW225_210901	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]cardno.com.au

DERP LAB REPORTS
- EDI Format - ESDAT (ESDAT) — Email — [redacted]

[redacted]
- A4 - AU Tax Invoice (INV) — Email — [redacted]

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]
- Chain of Custody (CoC) (COC) — Email — [redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]
- EDI Format - XTab (XTAB) — Email — [redacted]

ALSCompass
SAMPLING *Intelligence*

ALS

Environmental Division
Perth
Work Order Reference
EP2110160

Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: DEF9029 **Client:** Cardno **Project Manager:** [redacted]

#27107, 27085, 27037, 27093

ALS Compass COC Reference: #27086, 27088 **# Samples:** 2 eskies **Sampler:** **Phone:**

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Please send Eurofins Trip to their lab (QC218)

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
[redacted]	[redacted]		
Date / Time:	**Date / Time:**	**Date / Time:**	**Date / Time:**
01/09/21 . 5pm	2/9 1415		

CHAIN OF CUSTODY

ALS COC#: **27107** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0089_MW224		01/09/2021 01:08 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 27107 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0089_MW224	Ground Waters WATER	Water	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 27107 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0089_PFASOMP

SITE: SC-DEF19009/Stirling GW

ORDER NO: DEF19009/730

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0089_MW224	Clear Plastic Bottle - Natural	250 mL	00071020084178	Green	No	
001	0089_MW224	HDPE (no PTFE)	20 mL	00352010070518	Grey	No	
001	0089_MW224	HDPE (no PTFE)	20 mL	00352010070752	Grey	No	

Total Bottle Count: ALS: 3, Non ALS: 0

APPENDIX

D

FIELD RECORDS & CALIBRATION CERTIFICATES

Cardno

Table D1 - Groundwater Field Records

PFAS OMP Q3 2021 sampling event
HMAS Stirling

Monitoring Date	Specific Site	Monitoring Location	Sample ID	Screen Interval (mbgl)	TOC (mAHD)	Well Depth (m)	SWL Time	SWL (mbTOC)	RWL (mAHD)	Observations on Bore/Site	Sampling Method	Temp (Co)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Dup Sample #	Odour Comments	Colour	R2 Temp (C0)	R2 DO (mg/L)	R2 EC (us/Cm)	R2 TDS (mg/L)2	R2 pH	R2 Eh (mV)	R3 Temp (C0)	R3 DO (mg/L)	R3 EC (us/Cm)	R3 TDS (mg/L)	R3 pH	R3 Eh (mV)
31/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW010	0089_MW010_210831	NA	4.859	9.2	12:24	4.635	0.224		Hydrasleeve	21.1	1.13	3054	1989	7.26	-111.6		Diesel	Cloudy,Clear											
30/08/2021	Stirling/Fire Training Area	MW109	0089_MW109_210830	2.5-5.5_	4.446	5.5	09:12	4.12	0.326		Hand Bailing	20.1	2.41	842	546	7.36	37.5			Clear	20.1	2.12	842	546	7.3	31.5	19.7	1.9	847	552.5	7.27	28.8
30/08/2021	Stirling/Fire Training Area	MW112	0089_MW112_210830	3.0 - 6.0	3.973	6	09:57	3.46	0.513		Hydrasleeve	19.7	2.39	523.7	340.6	7.51	80.2			Brown											
30/08/2021	Stirling/Fire Training Area	MW117	0089_MW117_210830	3.0 - 6.0	3.762	6	09:43	3.47	0.292		Hydrasleeve	19.6	1.32	684	442	7.35	68			Clear											
30/08/2021	Stirling/Fire Training Area	MW120	0089_MW120_210830	2.5-5.5_	4.409	5.5	10:07	4.06	0.349		Hydrasleeve	19.7	2.26	639	416	7.5	74.6			Cloudy											
30/08/2021	Stirling/Fire Training Area	MW121	0089_MW121_210830	2.7-5.7_	3.7	5.7	08:37	4.275	-0.575		Hydrasleeve	20.3	5.72	733	481	7.72	87.4			Clear,Cloudy											
30/08/2021	Stirling/Fire Training Area	MW123	0089_MW123_210830	4.5-8_	6.62	8	08:51	6.265	0.355	Hand bailed.Slight hydrocarbon odour	Hand Bailing	19.6	1.74	770	500.5	7.38	-190.2		Slight hydrocarbon	Clear	19.3	1.81	771	500.5	7.38	-187.6	18.7	1.78	772	500.5	7.37	-179.6
30/08/2021	Stirling/Fire Training Area	MW124	0089_MW124_210830	0.75-4_	1.899	4	08:51	1.78	0.119		Hydrasleeve	17	1.27	42307	27495	7.26	-226.3			Clear											
30/08/2021	Stirling/Fire Training Area	MW125	0089_MW125_210830	0.9-3.9_	1.882	3.9	09:10	1.77	0.112	QC101, QC201	Hydrasleeve	17.6	0.5	29455	19142.5	7.18	-205.3	QC101, QC201	Salty	Clear											
30/08/2021	Stirling/Fire Training Area	MW126	0089_MW126_210830	0.9-3.9_	1.948	3.9	09:27	1.79	0.158		Hydrasleeve	18.8	1.24	43803	28470	6.94	-217.3		Salty	Clear											
30/08/2021	Stirling/Fire Training Area	MW127	0089_MW127_210830	0.9-3.9_	1.771	3.9	09:40	1.59	0.181		Hydrasleeve	18.5	0.77	36917	23998	7.05	-216		Salty	Clear											
30/08/2021	Stirling/Fire Training Area	MW128		2.5-5.5_	4.537	5.5	10:31		Dry																						
30/08/2021	Stirling/Demolition Ground	MW137		0.9 - 3.9	2.058	3.9			Dry																						
31/08/2021	Stirling/Demolition Ground	MW139	0089_MW139_210831	2.0 - 5.0	2.273	5	09:51	1.975	0.298		Hydrasleeve	19.8	3.57	565	346	8.07	99.8			Clear											
31/08/2021	Stirling/Demolition Ground	MW141	0089_MW141_210831	2.0 - 5.0	3.025	5	10:05	2.725	0.3		Hydrasleeve	24.1	2.83	14365	9334.5	7.13	-161.8			Clear											
30/08/2021	Stirling/Demolition Ground	MW142	0089_MW142_210830	0.25-4_	2.573	4	11:28	2.338	0.235		Hydrasleeve	18.3	2.18	25163	16367	7.74	-97.8			Cloudy											
30/08/2021	Stirling/Demolition Ground	MW147		2-5_	3.423	5.2	12:38		Dry																						
30/08/2021	Stirling/Demolition Ground	MW149	0089_MW149_210830	1-4_	2.303	4	11:47	2.066	0.237		Hydrasleeve	16	5.05	51642	33553	7.87	50.9			Clear											
30/08/2021	Stirling/Waste Water Treatment Plant	MW158	0089_MW158_210830	NA	14.541	15.82	11:49	14.58	-0.039	QC110/210	Hydrasleeve	19.7	2.51	13576	8827	7.25	101.4	QC110/210		Clear											
30/08/2021	Stirling/Waste Water Treatment Plant	MW161	0089_MW161_210830	NA	17.225	18.13	12:40	14.6	2.625		Hydrasleeve	20.2	2.71	3193	2073.5	7.46	88.1			Clear											
30/08/2021	Stirling/Waste Water Treatment Plant	MW166	0089_MW166_210830	10-13_	11.89	13	12:42	11.75	0.14		Hydrasleeve	19.6	1.07	3888	2528.5	7.4	43.5			Cloudy,Clear											
30/08/2021	Stirling/Waste Water Treatment Plant	MW171	0089_MW171_210830	28.5-31.5_	29.238	31.5	12:44	28.6	0.638		Hydrasleeve	19.6	2.14	10080	6552	7.3	-117.4			Clear											
30/08/2021	Stirling/Waste Water Treatment Plant	MW172		-0_	16.772	26	13:02		Dry																						
30/08/2021	Stirling/Waste Water Treatment Plant	MW173		NA	10.08	11.11	17:39		Dry																						
30/08/2021	Stirling/Waste Water Treatment Plant	MW193	0089_MW193_210830	10.5-13.5_	11.86	13.5	14:32	11.31	0.55	QC113/213	Hydrasleeve	19.1	1.89	3759	2444	7.33	-86.2	QC113/213		Black											
30/08/2021	Stirling/Waste Water Treatment Plant	MW195D	0089_MW195D_210830	10-13_	4.363	13	13:42	4.27	0.093	QC111/211	Hydrasleeve	19.6	0.97	30466	9805.5	7.5	-94.9	QC111/211		Clear											
30/08/2021	Stirling/Waste Water Treatment Plant	MW195S	0089_MW195S_210830	3.5-6.5_	4.571	6.5	14:19	4.17	0.401		Hydrasleeve	19.9	1.88	5972	3880.5	7.32	1			Clear											
30/08/2021	Stirling/Waste Water Treatment Plant	MW196	0089_MW196_210830	NA	12.75	13.8	13:59	12.44	0.31	QC112, QC212	Hydrasleeve	20.8	4.68	652	422.5	8.1	-148.7	QC112, QC212		Clear,Cloudy											
1/09/2021	Stirling/Waste Water Treatment Plant	MW197	0089_MW197_210901	NA	2.28		09:39	2.001	0.279		Hydrasleeve	19.3	2.78	7303	4751	7.68	15.6			Clear											
30/08/2021	Stirling/Waste Water Treatment Plant	MW199	0089_MW199_210830	NA	11.8	NA	14:30	11.26	0.54		Hydrasleeve	20.5	3.16	1292	838.5	7.67	-154.4			Clear											
1/09/2021	Stirling/Waste Water Treatment Plant	MW200	0089_MW200_210901	NA	2.07		10:00	1.856	0.214		Hydrasleeve	18.1	2.32	7822	5083	7.89	44.1			Clear											
30/08/2021	Stirling/Waste Water Treatment Plant	MW202	0089_MW202_210830	NA	2.12	NA	15:33	1.85	0.27		Hydrasleeve	19.2	2.16	1493	968.5	7.6	-127.5			Clear											
30/08/2021	Stirling/Waste Water Treatment Plant	MW203	0089_MW203_210830	NA	10.855	12.9	14:49	10.43	0.425		Hydrasleeve	21	5.44	835	546	7.81	-141.6			Clear,Cloudy,Brown											
1/09/2021	Stirling/Helicopter Support Facility	MW214	0089_MW214_210901	5.5-9_	8.075	9	13:49	7.64	0.435	Bore blocked by fine sedimend. Unblocked.	Hydrasleeve	18.2	3.88	2914	1891.5	7.28	-138.8		Stagnant	Black,Cloudy											
1/09/2021	Stirling/Helicopter Support Facility	MW215	0089_MW215_210901	1.5 - 4.5	3.794	4.5	13:08	3.416	0.378	Blockage cleared with steel bailer	Hydrasleeve	18.9	1.7	1446	942	8.15	-26.2			Clear											
31/08/2021	Stirling/Helicopter Support Facility	MW216	0089_MW216_210831	6.0 - 9.0	8.329	9	10:54	7.909	0.42		Hydrasleeve	22	3.77	2545	1657.5	7.73	7.6			Clear											
31/08/2021	Stirling/Helicopter Support Facility	MW217	0089_MW217_210831	6.5-9.5_	8.847	9.5	08:48	8.355	0.492		Hydrasleeve	20.1	5.62	1170	760.5	7.57	-118.9			Clear,Cloudy											
31/08/2021	Stirling/Helicopter Support Facility	MW220		NA	NA	NA	09:34		Dry																						
31/08/2021	Stirling/Helicopter Support Facility	MW224	0089_MW224_210831	11.25 - 14.52	13.372	14.25	09:04	12.9	0.472	Well blocked by fine sediment/sand.	Hydrasleeve	19.1	6.18	905	585	7.7	-11105			Clear,Cloudy											
1/09/2021	Stirling/Helicopter Support Facility	MW225	0089_MW225_210901	2-5_	4.066	5	12:47	3.85	0.216	Unblocked and sampled with bailer	Hydrasleeve	18.2	2.26	2008	1306.5	7.6	-163.9			Cloudy,Black											
31/08/2021	Stirling/Helicopter Support Facility	MW226	0089_MW226_210831	0.75 - 3.8	1.749	3.8	14:32	1.716	0.033		Hydrasleeve	19.7	2.42	43481	28268	7.52	-197.1			Clear											
31/08/2021	Stirling/Helicopter Support Facility	MW227	0089_MW227_210831	0.75 - 3.75	2.961	3.75	13:57	2.807	0.154		Hydrasleeve	19.3	1.57	4600	2990	8.03	-135.6			Clear											
31/08/2021	Stirling/Helicopter Support Facility	MW228	0089_MW228_210831	NA	2.23	4.968	13:41	2.086	0.144		Hydrasleeve	20.3	0.72	24402	15860	7.49	-64.5			Clear											
30/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW233	0089_MW233_210830	NA	3.705	4.968	08:58	2.794	0.911	QC102/202	Hydrasleeve	15.6	2.1	442.6	287.95	8.39	190.6	QC102/202		Clear											
31/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW236	0089_MW236_210831	NA	4.642	5.66	08:45	3.95	0.692		Hydrasleeve	18.5	4.77	776	507	7.57	69.9			Clear											
31/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW238	0089_MW238_210831	NA	4.827	NA	10:43	3.975	0.852		Hydrasleeve	20.4	4.26	665	435.5	7.81	75.4			Clear											
31/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW239	0089_MW239_210831	NA	4.03	NA	10:53	3.26	0.77		Hydrasleeve	20.5	5.22	581	377	7.84	72.3			Brown											
31/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW240	0089_MW240_210831	NA	4.483	6.8	10:26	3.67	0.813		Hydrasleeve	21.4	2.92	834	539.5	7.5	81.3			Clear											
31/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW242	0089_MW242_210831	NA	3.539	4.76	11:47	2.755	0.784		Hydrasleeve	21.8	3.52	901	585	7.71	84			Clear											
31/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW243	0089_MW243_210831	NA	4.892	7	10:12	4.135	0.757		Hydrasleeve	19.9	2.86	800	520	7.64	80.6			Clear											
31/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW245	0089_MW245_210831	NA	4.551	5.65	11:05	3.79	0.761		Hydrasleeve	18.8	1.67	705	461.5	7.4	69.5			Cloudy											
31/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW248		NA	4.073	NA	13:09	3.81	0.263	Dry	Hydrasleeve																				
31/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW249	0089_MW249_210831	3.5 - 6.5	5.227	6.5	09:11	4.57	0.657		Hydrasleeve	19.9	2.56	1303	845	7.67	82.6			Clear											
31/08/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW255	0089_MW255_210831	3-6_	4.609	6	09:25	3.99	0.619	Murky	Hydrasleeve	20.2	2.21	928	604.5	7.45	-31.7			Cloudy											
31/08/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW256	0089_MW256_210831	3-6_	3.84	6	10:27	3.2	0.64		Hydrasleeve	19.7	1.86	1477	962	7.37	-175.5			Clear											
31/08/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW257	0089_MW257_210831	2.7-5.7_	3.806	5.7	09:54	3.225	0.581		Hydrasleeve	18.8	6.51	328.8	213.85	8.19	56.8			Clear											
31/08/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW258		3-6_	4.043	6	10:22		Dry																						
31/08/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW259	0089_MW259_210831	2.5-5.5_	3.8	5.5	08:56	3.65	0.15	Roots	Hydrasleeve	18.2	3.82	533.5	347.1	7.39	85.8			Clear											
31/08/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW261	0089_MW261_210831	3-6_	3.858	6	12:39	3.5	0.358		Hydrasleeve	20.8	1.8	1964	1274	7.34	-217.7		Diesel. Lots of black se	Clear											
31/08/2021	Stirling/Dredge Spoil / Careening Bay	MW264	0089_MW264_210831	3-6_	4.806	6	12:02	4.355	0.451		Hydrasleeve	20.4	3.31	2218	1443	7.57	96.3			Clear											
31/08/2021	Stirling/Dredge Spoil / Careening Bay	MW268	0089_MW268_210831	2.5-5.5_	4.056	5.5	13:59	3.91	0.146		Hydrasleeve	22.3	1.87	6717	4368	7.28	74.9			Clear											
31/08/2021	Stirling/Dredge Spoil / Careening Bay	MW269	0089_MW269_210831	2.5-5.5_	4.153	5.5	14:16	4.02	0.133		Hydrasleeve	21.4	1.61	1775	1150.5	7.41	-57.2			Clear											
31/08/2021	Stirling/Demolition Ground	MW272	0089_MW272_210831	0.9 - 3.9	2.226	3.9	10:19	2.682	-0.456		Hydrasleeve	19.1	2.2	30086	19565	7.2	-175.9			Clear											
31/08/2021	Stirling/Helicopter Support Facility	MW282	0089_MW282_210831	4.5-7.5_	5.78	7.5	09:23	5.24	0.54		Hydrasleeve	20	1.95	1003	650	7.21	-128.9			Cloudy,Brown											
31/08/2021	Stirling/Accommodation Area	MW288	0089_MW288_210831	2.25 - 5.25	4.003	5.25	08:41	3.692	0.311	Blockage cleared with steel bailer	Hydrasleeve	20.1	1.09	1178	767	7.83	57.4			Clear											
30/08/2021	Stirling/Accommodation Area	MW289	0089_MW289_210830	3.25-6.25_	4.495	6.25	09:24	3.853	0.642	QC103/203	Hydrasleeve	19.2	2.18	1064	689	7.68	205.7	QC103/203		Clear											
31/08/2021	Stirling/AVCAT Storage and Fuel Farm	MW516	0089_MW516_210831	4.5-7.5_	6.37	7.5	13:29	5.175	1.195		Hydrasleeve	23.6	0.87	2246	1462.5	7.12	72.8			Cloudy											
31/08/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW517	0089_MW517_210831	3-6_	4.77	6	09:57	3.145	1.625		Hydrasleeve	20.8	1.92	1094	708.5	7.72	-124.3			Clear,Cloudy											
31/08/2021	Stirling/Fire Station, Flammable/Hazardous Gc	MW518	0089_MW518_210831	3.5-6.5_	5.55	6.5	12:49	5.175	0.375	Roots present	Hydrasleeve	20.5	1.48	1912	1241.5	7.3	-18.9			Cloudy											

Monitoring Date	Specific Site	Monitoring Location	Sample_ID	Observations	Sampling Method	Temp (Co)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Dup Sample #	Odour	Colour
1/09/2021	Stirling/Waste Water Treatment Plant East	PW304	0089_PW304_210610		peristaltic pump		16.6	2.62	51304	33345	7.65	43.4		no	Clear
31/08/2021	Stirling/Helicopter Support Facility	PW306	0089_PW306_210609		peristaltic pump		18	6.13	52146	33917	7.57	29.9		no	Clear
31/08/2021	Stirling/Helicopter Support Facility	PW307	0089_PW307_210609		peristaltic pump		17.6	5.36	53079	34502	8.04	-119.8		no	Clear
31/08/2021	Stirling/Helicopter Support Facility	PW308	0089_PW308_210609		peristaltic pump		20.6	7.64	51369	34092	8.11	72.7		no	Clear
31/08/2021	Stirling/Helicopter Support Facility	PW314	0089_PW314_210609		peristaltic pump		18	4.46	53616	34840	7.9	-127.4		no	Clear
31/08/2021	Stirling/Helicopter Support Facility	PW315	0089_PW315_210609		peristaltic pump		18.2	10.97	1765	1198	7.94	80	QC116/216	no	Clear
31/08/2021	Stirling/Helicopter Support Facility	PW316	0089_PW316_210609		peristaltic pump		17.4	5.27	53034	34476	8.01	-157.9		no	Clear,Cloudy
30/08/2021	Stirling/Demolition Ground	PW329	0089_PW329_210608		peristaltic pump		14.9	1.98	52022	33832	7.95	-12.6		no	Clear
30/08/2021	Stirling/Demolition Ground	PW330	0089_PW330_210608		peristaltic pump		15.4	4.67	52755	34307	7.78	41.9		no	Clear
30/08/2021	Stirling/Demolition Ground	PW331	0089_PW331_210608		peristaltic pump		16.9	6.15	51797	33670	8.03	22.8		no	Clear
30/08/2021	Stirling/Fire Training Area	PW335	0089_PW335_210608		peristaltic pump		15.8	3.57	52830	34339	7.8	-148.6		no	Clear
30/08/2021	Stirling/Fire Training Area	PW340	0089_PW340_210608		peristaltic pump		15.9	1.91	51746	33637	7.72	-145.1		no	Clear
30/08/2021	Stirling/Fire Training Area	PW341	0089_PW341_210608		peristaltic pump		16	2.42	50897	33091	7.76	-175.3		no	Clear
1/09/2021	Stirling/Waste Water Treatment Plant East	PW345	0089_PW345_210609		peristaltic pump		15.7	1.34	41671	27085.5	6.99	-214.3		no	Clear,Brown
30/08/2021	Stirling/Waste Water Treatment Plant East	PW346	0089_PW346_210610	Clear water	peristaltic pump		17.1	2.81	50379	32747	7.65	-194.7		no	Clear
30/08/2021	Stirling/Waste Water Treatment Plant West	PW350	0089_PW350_210608		peristaltic pump		17.2	6	52311	34001.5	8.05	86.1		no	Clear
30/08/2021	Stirling/Waste Water Treatment Plant West	PW351	0089_PW351_210608		peristaltic pump		17.1	5.94	52547	34157.5	8.12	66.8		no	Clear
30/08/2021	Stirling/Waste Water Treatment Plant West	PW352	0089_PW352_210608		peristaltic pump		18.4	5.42	52492	34118.5	8.12	98.3		no	Clear
30/08/2021	Stirling/Demolition Ground	PW356	0089_PW356_210608		peristaltic pump		15.9	2.82	52187	33917	7.8	-68.1		no	Clear
30/08/2021	Stirling/Demolition Ground	PW357	0089_PW357_210608		peristaltic pump		15.5	2.09	52365	34040	7.88	40.3		no	Clear
30/08/2021	Stirling/Demolition Ground	PW358	0089_PW358_210608		peristaltic pump		16.1	2.28	52348	33943	7.86	3.7		no	Clear
30/08/2021	Stirling/Fire Training Area	PW362	0089_PW362_210608		peristaltic pump		15.8	1.92	52304	34001.5	7.81	-148		no	Clear
30/08/2021	Stirling/Fire Training Area	PW363	0089_PW363_210608		peristaltic pump		15.7	1.71	50818	33033	7.76	-159.3		no	Clear
30/08/2021	Stirling/Fire Training Area	PW364	0089_PW364_210608		peristaltic pump		15.7	1.99	51760	33644	7.71	-152.6	QC106, QC206	no	Clear
1/09/2021	Stirling/Waste Water Treatment Plant East	PW367	0089_PW367_210609		peristaltic pump		16.7	2.17	49987	32500	7.46	9.9		no	Clear
1/09/2021	Stirling/Waste Water Treatment Plant East	PW368	0089_PW368_210610		peristaltic pump		16.6	5.05	51073	33221	7.46	91.8		no	Clear
1/09/2021	Stirling/Waste Water Treatment Plant East	PW369	0089_PW369_210609		peristaltic pump		16.5	6.38	24706	16061	6.82	-100.5	QC118, QC218	no	Brown,Clear
1/09/2021	Stirling/Dredge Spoil / Careening Bay	PW374	0089_PW374_210610		peristaltic pump		15.9	5.73	52210	33936	8	-142.9		no	Clear
1/09/2021	Stirling/Dredge Spoil / Careening Bay	PW375	0089_PW375_210610		peristaltic pump		15.8	5.27	52402	34060	7.94	-142.9		no	Clear
1/09/2021	Stirling/Dredge Spoil / Careening Bay	PW378	0089_PW378_210610		peristaltic pump		16	5.75	52460	34099	7.95	-153.8		no	Clear
30/08/2021	Stirling/Waste Water Treatment Plant West	PW380	0089_PW380_210608		peristaltic pump		17.3	5.43	52878	34372	8.11	67.3		no	Clear
30/08/2021	Stirling/Waste Water Treatment Plant West	PW381	0089_PW381_210608		peristaltic pump		17.4	5.78	52556	34151	8.14	63		no	Clear
30/08/2021	Stirling/Waste Water Treatment Plant West	PW401	0089_PW401_210608		peristaltic pump		17.3	6.31	52291	33988.5	8.1	67.9		no	Clear
31/08/2021	Stirling/Helicopter Support Facility	PW405	0089_PW405_210610		peristaltic pump		19.1	1.63	51865	33709	7.8	-139	QC117, QC217	no	Clear
31/08/2021	Stirling/Helicopter Support Facility	PW407	0089_PW407_210610		peristaltic pump		18.6	1.16	52860	34359	7.81	-136.7		no	Clear
31/08/2021	Stirling/Helicopter Support Facility	PW409	0089_PW409_210610		peristaltic pump		18.9	1.58	53167	34586.5	7.81	-144.8		no	Clear
1/09/2021	Stirling/Helicopter Support Facility	PW411	0089_PW411_210609		peristaltic pump		15.9	5.81	52558	34164	7.83	-154.2		no	Clear
1/09/2021	Stirling/Helicopter Support Facility	PW413	0089_PW413_210609		peristaltic pump		16.1	6.09	5103	33611	8.03	104.6		no	Clear
1/09/2021	Stirling/Helicopter Support Facility	PW415	0089_PW415_210609		peristaltic pump		16.6	6.27	52152	33897	7.98	87.4		no	Clear

Site	Monitoring Location	Date	Sample ID	Time	Sampling Method	Sample Depth (m)	WaterBody Depth (m)	Flow Rate	Comments	Temp °C	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Water Colour	Turbidity
Stirling/Fire Training Area	SW134	30/08/2021	0089_SW134_210608		Direct_into_Bottle	0.1	0.6	Slow		16.4	5.59	53101	34515	7.97	-123.8	Clear	Low
Stirling/Fire Training Area	SW132	30/08/2021	0089_SW132_210608		Direct_into_Bottle	0.1	0.6	Slow		16.2	5.38	53095	34515	7.99	-132.1	Clear	Low
Stirling/Demolition Ground	SW156	30/08/2021	0089_SW156_210608	09:26	Direct_into_Bottle	0.15	0.5	Medium	QC104/204	16.7	4.34	52888	34378	7.88	-147.8	Clear	Low
Stirling/Demolition Ground	SW154	30/08/2021	0089_SW154_210608	10:23	Direct_into_Bottle	0.1	1	Fast	QC108/208	17	5.08	51820	33702	7.93	13.2	Clear	Low
Stirling/Demolition Ground	SW152	30/08/2021	0089_SW152_210608	11:17	Direct_into_Bottle	0.1	1	Fast		16.8	5.13	51556	33507	7.93	24.8	Clear	Low
Stirling/Demolition Ground	SW150	30/08/2021	0089_SW150_210608	11:45	Direct_into_Bottle	0.1	1	Fast		17.1	6.47	51910	33748	7.95	30.9	Clear	Low
Stirling/Fire Training Area	SW130	30/08/2021	0089_SW130_210608	13:11	Direct_into_Bottle	0.1	1	Fast		17.1	6.13	52057	3.839	8.01	24.2	Clear	Low
Stirling/Waste Water Treatment Plant West	SW353	1/09/2021	0089_SW353_210608	15:41	Direct_into_Bottle	0.15	0.5	Slow		17	5.17	52253	33969	7.94	-144.2	Clear	Low
Stirling/Waste Water Treatment Plant West	SW384	31/08/2021	0089_SW384_210608	15:45	Direct_into_Bottle	0.1	0.6	Fast	QC114, QC214	18.5	5.15	52731	34274.5	7.93	-131.1	Clear	Low
Stirling/Waste Water Treatment Plant West	SW383	31/08/2021	0089_SW383_210608	15:47	Direct_into_Bottle	0.1	0.6	Fast		18.6	5.78	53300	34645.5	8.09	-149.8	Clear	Low
Stirling/Waste Water Treatment Plant West	SW382	31/08/2021	0089_SW382_210608	15:53	Direct_into_Bottle	0.1	1	Fast		22.6	7.76	52532	34287	8.07	73.4	Clear	Low
Stirling/Waste Water Treatment Plant East	SW370	31/08/2021	0089_SW370_210609		Direct_into_Bottle	0.3	0.3	Slow		18.2	5.21	50586	2883.5	8.2	70.1	Clear	Low
Stirling/Helicopter Support Facility	SW310	31/08/2021	0089_SW310_210609	13:30	Direct_into_Bottle	0.3	0.3	Slow		17.6	5.13	51173	3267	8.17	65.9	Clear	Low
Stirling/Helicopter Support Facility	SW412	31/08/2021	0089_SW412_210609		Direct_into_Bottle	0.3	0.3	Slow		17.9	4.95	51342	3371	8.12	67.8	Clear	Low
Stirling/Helicopter Support Facility	SW414	30/08/2021	0089_SW414_210609		Direct_into_Bottle	0.1	1	Fast		17.5	6.62	52460	34099	8	81.6	Clear	Low
Stirling/Helicopter Support Facility	SW416	1/09/2021	0089_SW416_210609		Direct_into_Bottle	0.1	0.6	Medium		16.4	6.15	51948	33767.5	7.67	-148.5	Brown/clear	Low
Stirling/Helicopter Support Facility	SW311	1/09/2021	0089_SW311_210609	13:10	Direct_into_Bottle	0.1	0.5	Slow		16.9	5.24	51199	33280	7.76	-139.3	Clear	Low
Stirling/Helicopter Support Facility	SW309	1/09/2021	0089_SW309_210609	14:03	Direct_into_Bottle	0.1	0.6	Slow		17.3	6.09	52046	33826	7.96	-152.4	Clear	Low
Stirling/Helicopter Support Facility	SW410	30/08/2021	0089_SW410_210610	09:03	Direct_into_Bottle	0.1	1	Medium		17.2	4.93	48992	31856	7.5	166.1	Clear	Low
Stirling/Helicopter Support Facility	SW406	30/08/2021	0089_SW406_210610		Direct_into_Bottle	0.1	1	Fast		18.2	5.2	52620	34203	8.13	63.8	Clear	Low
Stirling/Waste Water Treatment Plant East	SW372	30/08/2021	0089_SW372_210610	11:49	Direct_into_Bottle	0.1	1	Fast		17.6	5.93	52224	33943	8.13	61.8	Clear	Low
Stirling/Waste Water Treatment Plant East	SW305	30/08/2021	0089_SW305_210610	12:26	Direct_into_Bottle	0.1	1	Medium		17.1	6.21	52220	33943	8.08	82.2	Clear	Low
Stirling/Waste Water Treatment Plant East	SW371	31/08/2021	0089_SW371_210610		Direct_into_Bottle	0.15	0.4	Slow		21.6	4.74	52058	33845	8.03	-119.2	Clear	Low
Stirling/Dredge Spoil / Careening Bay	SW317	31/08/2021	0089_SW317_210610	15:18	Direct_into_Bottle	0.1	1	Slow		22.1	5.87	50239	32740	7.72	6.3	Clear	Low
Stirling/Dredge Spoil / Careening Bay	SW318	31/08/2021	0089_SW318_210610	15:44	Direct_into_Bottle	0.1	1	Fast		21.2	6.06	51621	33553	7.91	-88.1	Clear	Low
Stirling/Helicopter Support Facility	SW408	1/09/2021	0089_SW408_210610	16:10	Direct_into_Bottle	0.1	1	Fast		16.5	7.19	27903	32109	8.09	97.5	Clear	Low
Stirling/Waste Water Treatment Plant East	SW373	1/09/2021	0089_SW373_210610		Direct_into_Bottle	0.1	1	Fast		16.8	6.65	52110	33871	8.04	90.4	Clear	Low
Stirling/Dredge Spoil / Careening Bay	SW319	1/09/2021	0089_SW319_210610	15:59	Direct_into_Bottle	0.1	1	Fast		17.1	6.6	52410	34066	7.97	83.5	Clear	Low

Site	Monitoring Location	Date	Sample ID	Depth of Sediment Sampling (m)	Sampling Method	Sample Condition	Sample Description	Other Comments
Stirling/Waste Water Treatment Plant East	SD304	1/09/2021	0089_SD304_210610	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	GREY SAND	
Stirling/Helicopter Support Facility	SD306	31/08/2021	0089_SD306_210609	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	GREY SAND	QC115/215
Stirling/Helicopter Support Facility	SD307	31/08/2021	0089_SD307_210609	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow/white, med to fine sand	
Stirling/Helicopter Support Facility	SD308	31/08/2021	0089_SD308_210609	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	GREY SAND	
Stirling/Helicopter Support Facility	SD314	31/08/2021	0089_SD314_210609	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	
Stirling/Helicopter Support Facility	SD315	31/08/2021	0089_SD315_210609	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	GREY SAND	
Stirling/Helicopter Support Facility	SD316	31/08/2021	0089_SD316_210609	1	Direct_into_Bottle,Shovel_Trowel	Wet	White/yellow, fine to med sand	
Stirling/Demolition Ground	SD329	30/08/2021	0089_SD329_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Grey sand	
Stirling/Demolition Ground	SD330	30/08/2021	0089_SD330_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Grey sand	
Stirling/Demolition Ground	SD331	30/08/2021	0089_SD331_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Grey sand	
Stirling/Fire Training Area	SD335	30/08/2021	0089_SD335_210608	0.4	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	
Stirling/Fire Training Area	SD340	30/08/2021	0089_SD340_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	QC107/207
Stirling/Fire Training Area	SD341	30/08/2021	0089_SD341_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Grey/yellow med sand	
Stirling/Waste Water Treatment Plant East	SD345	1/09/2021	0089_SD345_210609	0.4	Direct_into_Bottle,Shovel_Trowel	Wet	Grey, med sand and seaweed	
Stirling/Waste Water Treatment Plant East	SD346	30/08/2021	0089_SD346_210610	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	GREY Sand	QC105/205
Stirling/Waste Water Treatment Plant West	SD350	30/08/2021	0089_SD350_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	
Stirling/Waste Water Treatment Plant West	SD351	30/08/2021	0089_SD351_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	
Stirling/Waste Water Treatment Plant West	SD352	30/08/2021	0089_SD352_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	
Stirling/Demolition Ground	SD356	30/08/2021	0089_SD356_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Grey sand	QC109/209
Stirling/Demolition Ground	SD357	30/08/2021	0089_SD357_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Grey orange sand	
Stirling/Demolition Ground	SD358	30/08/2021	0089_SD358_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Grey sand	
Stirling/Fire Training Area	SD362	30/08/2021	0089_SD362_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	
Stirling/Fire Training Area	SD363	30/08/2021	0089_SD363_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	
Stirling/Fire Training Area	SD364	30/08/2021	0089_SD364_210608	0.4	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow/grey med sand	
Stirling/Waste Water Treatment Plant East	SD367	1/09/2021	0089_SD367_210609	0.4	Direct_into_Bottle,Shovel_Trowel	Wet	White/grey med sand	
Stirling/Waste Water Treatment Plant East	SD368	1/09/2021	0089_SD368_210610	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	GREY SAND	
Stirling/Waste Water Treatment Plant East	SD369	1/09/2021	0089_SD369_210609	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	White, fine to med grain sand	
Stirling/Dredge Spoil / Careening Bay	SD374	1/09/2021	0089_SD374_210610	0.6	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow/white med grain sand	
Stirling/Dredge Spoil / Careening Bay	SD375	1/09/2021	0089_SD375_210610	0.6	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow med sand	
Stirling/Dredge Spoil / Careening Bay	SD378	1/09/2021	0089_SD378_210610	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	
Stirling/Waste Water Treatment Plant West	SD380	30/08/2021	0089_SD380_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	
Stirling/Waste Water Treatment Plant West	SD381	30/08/2021	0089_SD381_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	
Stirling/Waste Water Treatment Plant West	SD401	30/08/2021	0089_SD401_210608	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow, med grain sand	
Stirling/Helicopter Support Facility	SD405	31/08/2021	0089_SD405_210610	0.3	Direct_into_Bottle,Shovel_Trowel	Wet	Grey/yellow fine sand	
Stirling/Helicopter Support Facility	SD407	31/08/2021	0089_SD407_210610	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Grey/yellow fine sand	
Stirling/Helicopter Support Facility	SD409	31/08/2021	0089_SD409_210610	0.3	Direct_into_Bottle,Shovel_Trowel	Wet	Grey/white, fine to med sand	
Stirling/Helicopter Support Facility	SD411	1/09/2021	0089_SD411_210609	1.2	Direct_into_Bottle,Shovel_Trowel	Wet	Yellow/grey med sand	
Stirling/Helicopter Support Facility	SD413	1/09/2021	0089_SD413_210609	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Grey Sand	
Stirling/Helicopter Support Facility	SD415	1/09/2021	0089_SD415_210609	0.5	Direct_into_Bottle,Shovel_Trowel	Wet	Grey Sand	

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20K104050
Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	170.70 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 57.97
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 5 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	15.6	0	°C	NA	15.6	°C
pH	pH 7.00	356684	7.01	-15.40	mV	7.06	7.01	pH
pH	pH 4.00	355385	4.00	155.30	mV	4.04	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	4.89	2813	2764	µs/cm
ORP (Reference check only)	Zobell A & B	21/0502	250	250	mV	243.9	244.2	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	-0.2	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	4.39	uA	109.8	100.0	%

Calibrated by: [redacted]

Calibration Date: 11-Aug-21
Next Due: 07-Feb-22

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20D101953
Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	171.30 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.14
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 5 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	15.7	0	°C	NA	15.7	°C
pH	pH 7.00	361531	7.01	-33.80	mV	7.59	7.01	pH
pH	pH 4.00	362911	4.00	137.50	mV	4.59	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.06	2729	2764	µs/cm
ORP (Reference check only)	Zobell A & B	21/0502	249	249	mV	217.7	244.1	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	0.4	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	4.17	uA	113.5	100.0	%

Calibrated by: [redacted]

Calibration Date: 24-Aug-21
Next Due: 20-Feb-22

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20D101040
Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	172.20 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.46
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 5 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	15.7	0	°C	NA	15.7	°C
pH	pH 7.00	361531	7.01	-37.20	mV	7.1	7.01	pH
pH	pH 4.00	362911	4.00	135.00	mV	4.08	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.00	2750	2764	µs/cm
ORP (Reference check only)	Zobell A & B	21/0502	249	249	mV	247	244.2	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	-0.8	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	4.01	uA	96.6	100.0	%

Calibrated by: [redacted]

Calibration Date: 24-Aug-21
Next Due: 20-Feb-22

Stirling August/September 21 Bump Test Records

Date	Standard	Units	Acceptable Range	YSI Serial No.		
				20D101040	20K104050	20D101953
31/08/2021	EC 35	mS/cm	5%	35221	35025	34952
	pH4	pH units	3.9 - 4.1	4.05	4.02	4.33
	pH7	pH units	6.9 - 7.1	7.00	7.06	6.98
	DO 0%	PPM	0.1 ppm	0.04	0.05	0.05
	Ambient Air (100%)	PPM	0.5 ppm	Y	Y	Y
1/09/2021	EC 35	mS/cm	5%	34258		34159
	pH4	pH units	3.9 - 4.1	4.34		4.26
	pH7	pH units	6.9 - 7.1	7.09		6.91
	DO 0%	PPM	0.1 ppm	1.9		0.6
	Ambient Air (100%)	PPM	0.5 ppm	Y	Y	Y

Note: Bump Test readings outside the acceptable range are in red

APPENDIX

E

DATA QUALITY REVIEW

Data Quality Review
PFAS Ongoing Monitoring Plan Quarterly Monitoring Factual Report

This appendix reviews the Quality Assurance (QA) and Quality Control (QC) documentation. Quality assurance encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation should also include an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples submitted such as field blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

<table>
<tr><th>QA/QC Aspects</th><th>Evidence & Evaluation</th></tr>
<tr><td colspan="2">QA Documentation</td></tr>
<tr><td>Project Quality Plan/Work Plan and Data Quality Objectives</td><td>The field investigation was carried out between the 30 August 2021 and 1 September 2021 and is in accordance with the proposed scope of work, as documented in the SAQP (ref DEF19009_ HMAS_Stirling_SAQP_Rev5) issued to the client and in general compliance with the Australian standards AS 4482.1-2005 “Guide to Sampling and Investigation of Potentially Contaminated Soil, Part 1: Non-volatile and Semi-volatile Compounds”, Standards Australia 1998. AS/NZ 5667:1998 Water quality – sampling and NEPM “National Environment Protection (Assessment of Site Contamination) Measure”.
A quality control program was implemented during the Investigation and the quality assurance procedures used have been reiterated in the report (DEF19009_2021 Q3 OMP Factual Report_HMAS Stirling). In addition, a Health, Safety and Environment Work Method Statement (HSEWMS) was also prepared.
The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.</td></tr>
<tr><td colspan="2">Data Representativeness</td></tr>
<tr><td>Use of Composites</td><td>No Composites were used during the investigation</td></tr>
<tr><td>Holding Times</td><td>Chain of custody and laboratory reports provide evidence of holding times.
Groundwater, surface water and pore water:
No holding time non-compliance was reported for any water samples.
Sediment:
No holding time non-compliance was reported for the sediment samples.</td></tr>
<tr><td>Background samples</td><td>No background samples were collected as part of this investigation.</td></tr>
<tr><td>Verification of field procedures</td><td>The methodology conducted during this investigation is documented in the body of the report, and was in general conformance with the SAQP.
Non-disposable equipment was decontaminated between sample locations.</td></tr>
<tr><td colspan="2">Data Precision & Accuracy</td></tr>
<tr><td>QC sample Frequency</td><td colspan="2"><table>
<tr><th>QC sample type</th><th>SAQP required frequency</th><th>Sample Collected</th></tr>
<tr><td>Blind duplicate</td><td>1 in 10 primary water samples (10%)
>1 in 20 primary sediment samples (>5%)</td><td>14 for 127 primary water samples (11%)
4 for 39 primary sediment samples (10.2%)</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>QA/QC Aspects</th><th>Evidence & Evaluation</th></tr>
<tr><td></td><td>
<table>
<tr><td>Split duplicate</td><td>1 in 10 primary water samples (10%)
>1 in 20 primary sediment samples (>5%)</td><td>14 for 127 primary water samples (11%)
4 for 39 primary sediment samples (10.2%)</td></tr>
<tr><td>Rinsate</td><td>1 per day / equipment used</td><td>8 (3x equipment for 2 days and 2x equipment for 1 day) (100%)</td></tr>
<tr><td>Field Blank</td><td>1 per day / field team (esky)</td><td>8 (3x field teams for 2 days and 2x equipment for 1 day) (100%)</td></tr>
</table>
QC sample frequency was compliant with the SAQP for water and sediment duplicates, rinsates and field blanks.</td></tr>
<tr><td>QC Testing – Blind Replicates (Primary Lab)</td><td>
▪ Relative Percentage Difference (RPD) Acceptance Criteria:
<table>
<tr><th>Magnitude of Results</th><th>Acceptable RPD range</th></tr>
<tr><td>< 10 x LOR</td><td>No limits</td></tr>
<tr><td>10 – 20 LOR</td><td>0% - 50%</td></tr>
<tr><td>> 20 x LOR</td><td>0% - 20%</td></tr>
</table>
Groundwater, Porewater & Surface water
▪ Number of primary samples analysed: 127
▪ Duplicate samples analysed: 4
Sediment
▪ Number of primary samples analysed: 39
▪ Duplicate samples analysed: 4
The level of RPD is generally minor and probably related to the low analyte concentrations of analyte pairs.</td></tr>
<tr><td>QC Testing – Field Splits (Secondary Lab)</td><td>
▪ Relative Percentage Difference (RPD) Acceptance Criteria:
<table>
<tr><th>Magnitude of Results</th><th>Acceptable RPD range</th></tr>
<tr><td>< 10 x LOR</td><td>No limits</td></tr>
<tr><td>10 – 20 LOR</td><td>0% - 50%</td></tr>
<tr><td>> 20 x LOR</td><td>0% - 20%</td></tr>
</table>
Groundwater, Porewater & Surface water
▪ Number of Samples Analysed: 141 (including QC)
▪ Field Split Samples Analysed: 14
Sediment
▪ Number of Samples Analysed: 43 (including QC)
▪ Field Split Samples Analysed: 4
The level of RPD is generally minor and probably related to the low analyte concentrations of analyte pairs and/or difference of methodologies between the primary and secondary laboratories.</td></tr>
<tr><td>Field Blanks</td><td>Field Blanks were collected at a rate of one per field team (esky) per fieldwork day. All field blank samples tested reported analytes below the laboratory limit of reporting.</td></tr>
<tr><td>Laboratory Internal QC</td><td>Evidence of the laboratories internal QC testing is present and complete in the reports. ALS (Primary) performed internal QC with adequate testing and satisfactory results for method blank, laboratory control samples and laboratory duplicates.
All Matrix Spikes generally reported recoveries within the acceptance range of 70% to 130% with the exception of the following:
▪ EP2110017, EP2110021, EP2110072, EP2110154, EP2110155
- Water sample Sulfate and chloride matrix spike recovery not determined due to the background concentrations exceeding 4x spike level.</td></tr>
</table>

QA/QC Aspects	Evidence & Evaluation
	▪ EP2110019, EP2110020 - Water sample PFHxS, PFHpA and PFOA matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2110073 - Water sample PFBS, PFPeA, PFHxA matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. All Quality Control sample frequencies were of an acceptable rate with exception of the following: ▪ EP2110156, EP2110157 - Lab Duplicates for moisture content were undertaken less than the target rate. ▪ EP2110021 - Lab duplicates for Sulfate and Chloride were undertaken less than the target rate. ▪ EP2110019, EP2110020, EP2110154 - Lab duplicates for PFAS were undertaken less than the target rate.
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were generally lower than the respective assessment criteria.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature. ALS Accreditation No. 825 Eurofins Accreditation No. 1261
Calibration of Field Equipment	All equipment used during the investigation was calibrated by the supplier prior to use. The equipment calibration certificates are provided in Appendix D. Cardno undertook in-field calibration checks (bump tests) for each YSI water quality meters per day of sampling. The bump tests found all parameters to be within the acceptable range. As such, Cardno is satisfied that the equipment calibrations were acceptable for this assessment.
Decontamination and Equipment Blanks	Rinsate blanks were collected at a rate of one per day when reusable equipment is used (i.e. YSI, dipper, pore water sampler...). All rinsate samples tested reported analytes concentrations below the laboratory LORs.
	Data Comparability
Standard Procedures	Fieldwork procedures are detailed in the SAQP and reports and are comparable for each phase of Investigation.
Qualified Personnel	Staff involved in managing and reviewing the project and those involved in fieldwork are qualified personnel.
Sample Integrity	Field Chain of Custody/Laboratory request forms can be found in Appendix C.
	Data Completeness
Completeness of test program	The scope of work undertaken was generally consistent with the SAQP.
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection process for groundwater and therefore, the data set used as the basis for groundwater investigation is considered valid and complete.

APPENDIX

F

INFORMATION ABOUT ENVIRONMENTAL REPORTS

About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- A factual report of the condition of a portion of the site or one aspect of an entire site.
- Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- Validation of the success of remediation of a site or a portion of a site.
- Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide "environmental sign-off" of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants' duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the "hot spot" method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as “residential – low density”, “commercial” etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

The ESA Report is prepared in a manner that can be easily read by a lay person with a legitimate interest in the contamination status of the site, such as the site owner or occupier, EPA and Local Planning Authority. The ESA report is not intended for use by other parties or for other purposes. Anyone who uses the assessment report for purposes other than specified in the report, does so at their own risk.

The site should only be used for one or more of the beneficial uses and land uses identified in the ESA as suitable.

The conditions and qualifications may apply to the suitability of the site for use, and it is the responsibility of the Client to be cognizant of and accept these in accepting the report. Cardno are only responsible for the issuing of the ESA report but accepts no liability for the costs incurred in the implementation of ESA findings.

The ESA provides a “snapshot” of the site conditions at the time of the site investigation. Consequently, the report may not be valid at a later time if there has been any change to the contamination status of the site in that time. Verification of the status of the site may be required in cases where a significant time has elapsed, or site conditions have changed since the assessment and audit.

The ESA is necessarily limited by constraints such as time, cost and available information; although normal professional practice at the time has been applied with all due care to prepare the report. A necessary requirement of this process is the horizontal and vertical interpolation of data from discrete locations. However, site conditions are generally not homogenous and some discrepancies will occur between the actual and predicted results at locations not directly sampled. There is a risk that contamination may occur at the site and not be identified by a competent investigation and assessment. The approach adopted in sampling (a combination of statistically based grid and judgmental sampling) seeks to reduce, but cannot eliminate, this risk.

Where unexpected occurrences of contamination arise, subsequent to the issue of the ESA Report, Cardno should be permitted to make an interpretation of these facts in relation to the ESA Report findings. Consequently, the Client should inform Cardno and seek their opinion. Cardno accepts no liability for costs incurred due to such

unexpected occurrences, given the inherent uncertainties in the assessment process.

Cardno uses information provided by other parties as the basis for the ESA, and reliance on this information is at the discretion of Cardno. However, however Cardno cannot guarantee any of the facts, findings or conclusions presented by other parties. Cardno will not be liable for the use of information, provided by others that is subsequently found to be intentionally misleading.

The ESA Report is not and does not purport to be anything other than a contaminated land ESA. It is not a geotechnical report and bore logs reproduced are for interpretation of the likely distribution of contamination. They are not intended for geotechnical interpretations and may not be adequate for this purpose.

The ESA Report is not intended to be a comprehensive analysis of the presence and associated risk of asbestos in buildings and services. Where asbestos in buildings and services is known or likely, the report may only caution that an appropriately qualified person be engaged to undertake demolition to avoid contamination of the site.

Cardno

13 August 2015

APPENDIX

D

DATA ASSESSMENT

Cardno

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Stantec

					PFAS - Perfluoroalkyl Carboxylic Acids															PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																	*0.07*		
PFAS NEMP 2020 Interim Marine 99%									0.00023						19																			
PFAS NEMP 2020 Recreational Water															**10**																	**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																														
		12/01/2017	**E06_MW43_170112**	**530261**					0.15						<0.01								<0.05											
		26/09/2019	**0089_MW010_190926**	**679542**	0.002	0.002	0.012	<0.001	0.015	<0.001	<0.005	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.027	0.03	0.033
		25/10/2019	**0089_MW010_191025**	**EP1911020**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
	MW010	**16/12/2020**	**0089_MW010_201216**	**EP2014092**	<0.02	<0.02	0.08	<0.02	0.02	<0.02	<0.1	<0.02	0.03	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.10**	0.13	0.13
		18/03/2021	**0089_MW010_210318**	**EP2102954**	<0.02	<0.02	0.06	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.08*	0.08	0.08
		9/06/2021	**0089_MW010_210609**	**EP2106516**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		31/08/2021	**0089_MW010_210831**	**EP2110073**	<0.02	<0.02	0.03	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06
		8/03/2017	**0089_MW109_S_170803**	**199045**	0.21	0.42	7.7	0.41	1.1	<0.002	0.077	0.13	0.99	0.11	0.47	0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW109_D_170920**	**176250**	0.37	0.58	14	1.0	1.8	<0.002	0.11	0.26	1.3	0.13	*0.61*	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW109_S_170920**	**176250**	0.37	0.63	13	0.96	1.3	<0.002	0.10	0.25	1.5	0.14	*0.58*	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/10/2017	**0089_MW109_D_171018**	**178113**	0.24	0.47	17	0.88	2.5	<0.02	0.12	0.26	1.6	0.20	*0.73*	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		18/10/2017	**0089_MW109_S_171018**	**178113**	0.23	0.46	17	0.85	2.4	<0.02	0.12	0.26	1.7	0.20	*0.75*	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		16/11/2017	**0089_MW109_D_171116**	**203411**	0.22	0.43	15	0.46	1.8	<0.02	0.11	0.23	1.7	0.20	*0.64*	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		16/11/2017	**0089_MW109_S_171116**	**203411**	0.22	0.41	16	0.40	1.8	<0.02	0.10	0.21	1.6	0.19	*0.61*	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		6/12/2017	**0089_MW109_D_171206**	**204243**	0.19	0.37	15	0.48	1.5	<0.002	0.084	0.28	1.3	0.14	0.53	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		6/12/2017	**0089_MW109_S_171206**	**204243**	0.19	0.38	15	0.40	1.3	<0.002	0.074	0.23	1.3	0.11	0.5	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
Fire Training Area	**MW109**	**18/01/2018**	**0089_MW109_D_180118**	**205797**	0.21	0.56	15	0.71	2.4	<0.002	0.12	0.19	1.5	0.21	0.54	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/01/2018	**0089_MW109_S_180118**	**205797**	0.21	0.58	16	0.68	2.4	<0.002	0.12	0.19	1.6	0.21	0.53	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/12/2019	**0089_MW109_191216**	**EP1913380**	0.29	0.58	10.5	0.91	8.96	<0.02	0.4	0.30	1.63	0.20	0.55	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***19.5***	22.8	24.3
		30/03/2020	**0089_MW109_200330**	**EP2003333**	0.24	0.38	6.60	0.37	4.75	<0.02	<0.1	0.11	0.98	0.08	0.32	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***11.4***	13.1	13.8
		15/07/2020	**0089_MW109_200715**	**EP2007385**	0.16	0.41	7.18	0.75	6.89	<0.02	<0.1	0.17	0.99	0.14	0.46	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***14.1***	16.0	17.2
		21/09/2020	**0089_MW109_200921**	**EP2010093**	0.18	0.48	11.7	1.22	9.59	<0.02	0.1	0.24	1.31	0.16	*0.63*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***21.3***	23.9	25.6
		14/12/2020	**0089_MW109_201214**	**EP2013984**	0.12	0.31	8.32	1.10	10.0	<0.02	0.1	0.22	1.31	0.15	0.48	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***18.3***	20.7	22.1
		16/03/2021	**0089_MW109_210316**	**EP2102833**	0.34	0.58	3.64	0.22	3.72	<0.02	<0.1	0.10	0.62	0.06	0.18	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***7.36***	8.66	9.46
		8/06/2021	**0089_MW109_210608**	**EP2106448**	0.43	0.94	15.2	1.99	38.0	<0.02	0.2	0.64	3.70	0.25	*0.94*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***53.2***	59.4	62.4
		30/08/2021	**0089_MW109_210830**	**EP2110020**	0.13	0.28	3.28	0.18	1.59	<0.02	<0.1	0.09	0.46	0.06	0.16	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***4.87***	5.77	6.23
		30/10/2010	**DS3-MB01**	**EP1005976**					16.4						*5.18*																			
		22/10/2013	**WA0001_D53_MB01**	**EP1308039**					41.5						*1.84*								0.1											
		26/05/2015	**D53_MB01**	**EP1510572**					38.5						*2.26*								<0.1	<0.1										
		29/09/2015	**WA0001_MB01**	**EP1514335**					7.41						*3.02*								<0.1	<0.1										
		23/02/2016	**D53_MB01**	**EP1601568**					20.7						*2.05*								<0.1	<0.1										
		25/10/2016	**D53_MB01**	**521581**					43						2.6								0.2											
		8/03/2017	**0089_MW112_S_170803**	**199045**	0.28	0.79	21	1.5	26	<0.002	0.16	0.46	2.3	0.6	*3.1*	0.027	0.003	<0.002	<0.005	<0.01	<0.05	<0.001	0.073	0.004	<0.001	0.48	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW112_D_170920**	**176250**	0.49	1.1	25	3.5	1.2	<0.002	0.18	0.30	2.4	0.51	*3.3*	0.028	0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.069	0.002	<0.001	0.25	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW112_S_170920**	**176250**	0.17	0.55	13	1.9	1.6	<0.002	0.11	0.19	1.2	0.32	*1.8*	0.034	0.003	<0.002	<0.005	<0.01	<0.05	<0.001	0.087	0.003	<0.001	0.49	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/10/2017	**0089_MW112_D_171018**	**178113**	0.24	0.59	24	2.3	29	<0.02	0.14	0.41	2.1	0.51	*2.9*	0.028	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.086	<0.01	<0.01	0.31	0.005	<0.02	<0.05	<0.1	<0.02	<0.5			
		18/10/2017	**0089_MW112_S_171018**	**178113**	0.17	0.46	19	1.6	38	<0.02	0.12	0.34	1.5	0.44	*2.2*	0.032	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.11	0.010	<0.01	0.42	0.02	<0.02	<0.05	<0.1	0.022	<0.5			
Fire Training Area	**MW112**	**16/11/2017**	**0089_MW112_D_171116**	**203411**	0.18	0.43	16	1.2	21	<0.02	0.12	0.33	1.8	0.50	*2.4*	0.020	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.070	<0.01	<0.01	0.40	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		16/11/2017	**0089_MW112_S_171116**	**203411**	0.099	0.20	9.9	0.63	27	<0.02	0.10	0.20	1.1	0.44	*1.9*	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.054	<0.01	<0.01	0.48	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		6/12/2017	**0089_MW112_D_171206**	**204243**	0.17	0.41	16	1.2	25	<0.02	0.13	0.43	1.8	0.40	*2.5*	0.031	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.064	<0.01	<0.01	0.33	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		6/12/2017	**0089_MW112_S_171206**	**204243**	0.12	0.30	11	0.72	28	<0.02	0.13	0.43	1.5	0.47	*2.1*	0.040	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.054	<0.01	<0.01	0.36	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		18/01/2018	**0089_MW112_D_180118**	**205797**	0.31	0.77	17	2.1	22	<0.002	0.22	0.44	2.7	0.62	*2.3*	0.021	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.10	<0.001	<0.001	0.27	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/01/2018	**0089_MW112_S_180118**	**205797**	0.13	0.44	7.7	0.90	38	<0.002	0.21	0.48	2.0	0.72	*1.5*	0.039	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.064	<0.001	<0.001	0.57	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_MW112_200108**	**EP2000179**	0.04	0.10	4.94	0.48	19.6	<0.02	<0.1	0.12	0.56	0.16	0.56	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.13	<0.05	<0.05	0.26	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***24.5***	26.1	27.0
		30/03/2020	**0089_MW112_200330**	**EP2003333**	0.17	0.34	16.3	1.70	54.7	<0.02	0.2	0.48	2.04	0.51	*2.58*	0.06	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.17	<0.05	<0.05	0.58	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***71.0***	77.2	79.8
		15/07/2020	**0089_MW112_200715**	**EP2007385**	0.25	2.12	62.7	10.5	21.2	<0.02	0.2	0.75	4.48	0.63	*7.30*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.42	<0.05	<0.05	0.11	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***83.9***	97.9	111
		21/09/2020	**0089_MW112_200921**	**EP2010093**	0.17	0.95	33.7	5.38	17.5	<0.02	0.1	0.48	2.54	0.43	*4.30*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.13	<0.05	<0.05	0.23	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***51.2***	59.4	65.9
		14/12/2020	**0089_MW112_201214**	**EP2013984**	0.14	0.53	32.5	3.74	16.6	<0.02	0.2	0.41	2.86	0.54	*3.84*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.14	<0.05	<0.05	0.17	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***49.1***	57.2	61.7
		16/03/2021	**0089_MW112_210316**	**EP2102833**	0.17	1.52	36.6	5.00	14.4	<0.02	0.2	0.56	3.59	0.64	*4.28*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.15	<0.05	<0.05	0.14	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***51.0***	60.6	67.2
		8/06/2021	**0089_MW112_210608**	**EP2106448**	0.16	1.01	30.4	4.54	26.8	<0.02	0.2	0.56	2.95	0.53	*3.76*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.19	<0.05	<0.05	0.25	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***57.2***	65.6	71.4
		30/08/2021	**0089_MW112_210830**	**EP2110020**	0.08	0.31	7.60	1.14	31.7	<0.02	0.1	0.32	1.07	0.37	*0.94*	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.05	<0.05	<0.05	0.47	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***39.3***	42.2	44.2
		30/10/2010	**DS3-MB02**	**EP1005976**					10.1						*1.6*																			
		22/10/2013	**WA0001_D53_MB02**	**EP1308039**					31.9						*2.7*								0.2											
		26/05/2015	**D53_MB02**	**EP1510572**					43.9						*0.94*								0.1	<0.1										
		29/09/2015	**WA0001_MB02**	**EP1514335**					12.8						*1.56*								0.2	<0.1										
		23/02/2016	**D53_MB02**	**EP1601568**					32.4						0.47								<0.1	<0.1										
		25/10/2016	**D53_MB02**	**521581**					25						0.87								0.06											
		8/03/2017	**0089_MW117_S_170803**	**199045**	0.43	1.9	16	2.3	33	<0.002	0.22	0.55	3.8	0.57	*1.7*	0.012	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.08	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW117_D_170920**	**176250**	0.52	1.2	15	3.8	33	<0.002	0.26	0.36	2.5	0.19	*1.7*	0.01	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.11	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW117_S_170920**	**176250**	0.44	1.2	13	3.5	34	<0.002	0.22	0.34	2.5	0.23	*1.7*	0.011	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.12	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/10/2017	**0089_MW117_D_171018**	**178113**	0.40	1.1	14	2.5	39	<0.02	0.24	0.66	3.0	0.33	*1.8*	0.010	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.20	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		18/10/2017	**0089_MW117_S_171018**	**178113**	0.38	1.1	16	3.0	45	<0.02	0.20	0.58	3.0	0.39	*1.8*	0.011	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.14	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		16/11/2017	**0089_MW117_D_171116**	**203411**	0.37	1.0	15	1.9	30	<0.02	0.19	0.50	3.1	0.44	*2.1*	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.16	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
Fire Training Area	**MW117**	**16/11/2017**	**0089_MW117_S_171116**	**203411**	0.36	1.1	14	2.6	29	<0.02	0.17	0.47	3.0	0.48	*2.1*	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.20	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		6/12/2017	**0089_MW117_D_171206**	**204243**	0.43	1.2	18	2.9	31	<0.02	0.16	0.53	2.8	0.42	*1.6*	0.013	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.090	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		6/12/2017	**0089_MW117_S_171206**	**204243**	0.40	1.2	21	3.7	32	<0.02	0.13	0.42	2.6	0.44	*1.7*	0.017	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.076	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		18/01/2018	**0089_MW117_D_180118**	**205797**	0.38	0.87	13	3.3	30	<0.002	0.29	0.52	3.1	0.49	*2.2*	0.013	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.27	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/01/2018	**0089_MW117_S_180118**	**205797**	0.40	1.1	16	4.6	34	<0.002	0.27	0.49	3.5	0.56	*2.0*	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.21	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/12/2019	**0089_MW117_191216**	**EP1913380**	1.01	2.71	31.5	3.24	43.1	<0.02	0.9	1.26	6.12	0.59	*1.22*	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***74.6***	85.7	91.7
		30/03/2020	**0089_MW117_200330**	**EP2003333**	1.05	1.89	38.0	1.96	34.6	<0.02	0.2	1.42	5.63	0.59	*1.88*	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.08	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***72.6***	83.4	87.3
		15/07/2020	**0089_MW117_200715**	**EP2007385**	0.73	2.16	17.4	2.21	9.22	<0.02	<0.1	1.39	4.46	0.56	*1.60*	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.11	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***26.6***	35.5	39.9
		21/09/2020	**0089_MW117_200921**	**EP2010093**	0.78	1.31	20.0	1.92	32.1	<0.05	0.4	1.10	3.68	0.42	*1.38*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	0.08	<0.05	<0.05	<0.05	<0.12	<0.05	<0.12	<0.12	<0.05	<0.12	***52.1***	59.9	63.2
		14/12/2020	**0089_MW117_201214**	**EP2013992**	0.39	0.73	10.2	1.46	31.8	<0.02	0.3	0.49	2.58	0.25	*0.70*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***42.0***	46.8	49.0
		16/03/2021	**0089_MW117_210316**	**EP2102833**	0.57	1.35	13.0	2.18	25.0	<0.02	0.2	0.66	3.62	0.36	*1.11*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***38.0***	44.5	48.0
		8/06/2021	**0089_MW117_210608**	**EP2106448**	0.46	0.99	18.6	2.22	47.3	<0.02	0.3	0.68	3.96	0.27	*1.02*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***65.9***	72.6	75.9
		30/08/2021	**0089_MW117_210830**	**EP2110020**	0.23	0.51	9.16	2.00	40.6	<0.02	<0.1	0.18	1.25	0.21	*1.12*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***49.8***	52.8	55.3
		8/03/2017	**0089_MW120_S_170803**	**199045**	0.024	0.057	2.2	0.19	2.4	<0.002	0.02	0.031	0.13	0.027	0.14	<0.001	<0.002	<0.002

					PFAS - Perfluoroalkyl Carboxylic Acids														PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																	*0.07*		
PFAS NEMP 2020 Interim Marine 99%									0.00023						19																			
PFAS NEMP 2020 Recreational Water															**10**																	**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																														
		8/06/2021	**0089_MW121_210608**	**EP2106448**	0.09	0.30	10.5	0.39	2.86	<0.02	0.1	0.26	0.99	0.16	0.28	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***13.4***	15.3	16.0
		30/08/2021	**0089_MW121_210830**	**EP2110020**	0.19	0.48	11.4	1.03	76.5	<0.02	0.1	0.23	1.22	0.27	*1.42*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	0.43	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***87.9***	91.3	93.3
		8/03/2017	**0089_MW123_S_170803**	**199045**	0.038	0.029	0.16	0.003	0.37	<0.002	0.01	0.009	0.024	0.003	0.005	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW123_D_170920**	**176250**	0.045	0.036	0.23	0.002	0.43	<0.002	0.02	0.01	0.038	0.005	0.005	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW123_S_170920**	**176250**	0.046	0.036	0.20	0.002	0.45	<0.002	0.01	0.009	0.034	0.003	0.005	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/10/2017	**0089_MW123_D_171018**	**178113**	0.040	0.039	0.23	0.006	0.56	<0.002	0.01	0.01	0.043	0.005	0.007	<0.001	<0.002	<0.002	<0.02	<0.05	<0.2	<0.001	<0.001	<0.001	<0.005	<0.01	<0.02	<0.002	<0.02	<0.05	<0.002	<0.2			
		18/10/2017	**0089_MW123_S_171018**	**178113**	0.039	0.035	0.22	0.006	0.39	<0.002	0.01	0.01	0.043	0.005	0.006	<0.001	<0.002	<0.002	<0.02	<0.05	<0.2	<0.001	<0.001	<0.001	<0.005	<0.01	<0.02	<0.002	<0.02	<0.05	<0.002	<0.2			
		16/11/2017	**0089_MW123_D_171116**	**203411**	0.042	0.039	0.24	0.006	0.36	<0.002	0.020	0.020	0.060	0.006	0.007	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		16/11/2017	**0089_MW123_S_171116**	**203411**	0.039	0.048	0.23	0.005	0.32	<0.002	0.01	0.020	0.040	0.005	0.005	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
Fire Training Area	**MW123**	**6/12/2017**	**0089_MW123_D_171206**	**204243**	0.038	0.043	0.28	0.010	0.31	<0.002	0.020	0.024	0.062	0.007	0.007	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		6/12/2017	**0089_MW123_S_171206**	**204243**	0.044	0.056	0.24	0.007	0.26	<0.002	0.020	0.020	0.050	0.004	0.005	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/01/2018	**0089_MW123_D_180118**	**205797**	0.051	0.071	0.33	0.020	0.49	<0.002	0.026	0.020	0.084	0.008	0.012	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/01/2018	**0089_MW123_S_180118**	**205797**	0.049	0.068	0.29	0.020	0.46	<0.002	0.027	0.020	0.082	0.008	0.012	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/12/2019	**0089_MW123_191216**	**EP1913380**	0.06	0.11	1.09	<0.02	0.22	<0.02	<0.1	0.12	0.33	0.04	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.31*	1.88	1.99
		14/12/2020	**0089_MW123_201214**	**EP2013992**	0.08	0.05	0.17	<0.02	0.04	<0.02	<0.1	0.08	0.30	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.21*	0.67	0.72
		16/03/2021	**0089_MW123_210316**	**EP2102833**	0.11	0.08	0.48	<0.02	0.05	<0.02	<0.1	0.13	0.47	0.03	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.53*	1.27	1.35
		8/06/2021	**0089_MW123_210608**	**EP2106448**	0.16	0.13	0.68	<0.02	0.07	<0.02	<0.1	0.14	0.62	0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.75*	1.69	1.82
		30/08/2021	**0089_MW123_210830**	**EP2110020**	0.08	0.08	0.24	<0.02	0.03	<0.02	<0.1	0.05	0.25	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.27*	0.65	0.73
		8/03/2017	**0089_MW124_S_170803**	**199045**	0.003	0.001	0.006	<0.001	0.018	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW124_D_170920**	**176250**	0.005	0.002	0.003	<0.001	0.008	<0.002	0.002	<0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW124_S_170920**	**176250**	0.005	0.002	0.006	<0.001	0.007	<0.002	<0.002	<0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/10/2017	**0089_MW124_D_171018**	**178113**	<0.001	0.001	0.004	<0.001	0.012	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.02	<0.05	<0.2	<0.001	<0.001	<0.001	<0.005	<0.01	<0.02	<0.002	<0.02	<0.05	<0.002	<0.2			
		18/10/2017	**0089_MW124_S_171018**	**178113**	0.002	<0.001	0.003	<0.001	0.017	<0.002	0.002	<0.002	<0.001	<0.001	0.004	<0.001	<0.002	<0.002	<0.02	<0.05	<0.2	<0.001	<0.001	<0.001	<0.005	<0.01	<0.02	<0.002	<0.02	<0.05	<0.002	<0.2			
		16/11/2017	**0089_MW124_D_171116**	**203411**	0.004	0.003	0.003	<0.001	0.003	<0.002	<0.002	<0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		16/11/2017	**0089_MW124_S_171116**	**203411**	0.004	0.002	0.002	<0.001	0.008	<0.002	0.002	<0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
Fire Training Area	**MW124**	**6/12/2017**	**0089_MW124_D_171206**	**204243**	0.004	0.002	0.004	<0.001	0.005	<0.002	0.003	<0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		6/12/2017	**0089_MW124_S_171206**	**204243**	0.003	0.001	0.005	<0.001	0.005	<0.002	0.003	<0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/01/2018	**0089_MW124_D_180118**	**205797**	0.002	0.001	0.004	<0.001	0.005	<0.002	0.007	<0.002	0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/01/2018	**0089_MW124_S_180118**	**205797**	0.003	0.001	0.006	<0.001	0.010	<0.002	0.020	<0.002	0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		9/01/2020	**0089_MW124_200109**	**EP2000249**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	**0089_MW124_200330**	**EP2003333**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/07/2020	**0089_MW124_200715**	**EP2007382**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/09/2020	**0089_MW124_200922**	**EP2010151**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.01**	**0.01**	**0.01**
		14/12/2020	**0089_MW124_201214**	**EP2013984**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/03/2021	**0089_MW124_210315**	**EP2102752**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	**0089_MW124_210608**	**EP2106448**	0.12	0.26	1.57	0.03	0.17	<0.02	<0.1	0.07	0.42	0.03	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.74*	2.43	2.72
		30/08/2021	**0089_MW124_210830**	**EP2110019**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/03/2017	**0089_MW125_S_170803**	**199045**	0.049	0.074	0.24	<0.001	0.011	<0.002	0.008	0.006	0.041	0.002	0.002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW125_D_170920**	**176250**	0.087	0.12	0.32	<0.001	0.005	<0.002	0.01	<0.002	0.050	0.002	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW125_S_170920**	**176250**	0.077	0.11	0.30	<0.001	0.011	<0.002	0.01	<0.002	0.046	0.002	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/10/2017	**0089_MW125_D_171018**	**178113**	0.042	0.058	0.21	<0.001	0.011	<0.002	0.007	0.005	0.032	0.001	<0.001	<0.001	<0.002	<0.002	<0.02	<0.05	<0.2	<0.001	<0.001	<0.001	<0.005	<0.01	<0.02	<0.002	<0.02	<0.05	<0.002	<0.2			
		18/10/2017	**0089_MW125_S_171018**	**178113**	0.033	0.046	0.16	<0.001	0.011	<0.002	0.006	0.004	0.023	0.001	<0.001	<0.001	<0.002	<0.002	<0.02	<0.05	<0.2	<0.001	<0.001	<0.001	<0.005	<0.01	<0.02	<0.002	<0.02	<0.05	<0.002	<0.2			
		16/11/2017	**0089_MW125_D_171116**	**203411**	0.096	0.12	0.32	<0.001	0.003	<0.002	0.01	0.008	0.062	0.003	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		16/11/2017	**0089_MW125_S_171116**	**203411**	0.089	0.11	0.34	<0.001	0.003	<0.002	0.01	0.008	0.063	0.003	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
Fire Training Area	**MW125**	**6/12/2017**	**0089_MW125_D_171206**	**204243**	0.062	0.089	0.20	<0.001	0.006	<0.002	0.008	0.006	0.040	0.002	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		6/12/2017	**0089_MW125_S_171206**	**204243**	0.050	0.071	0.20	<0.001	0.007	<0.002	0.008	0.006	0.038	0.002	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/01/2018	**0089_MW125_D_180118**	**205797**	0.052	0.080	0.28	<0.001	0.013	<0.002	0.01	0.007	0.055	0.002	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/01/2018	**0089_MW125_S_180118**	**205797**	0.040	0.063	0.26	<0.001	0.007	<0.002	0.01	0.007	0.046	0.003	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		9/01/2020	**0089_MW125_200109**	**EP2000249**	0.10	0.15	0.66	<0.02	<0.01	<0.02	<0.1	<0.02	0.12	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.66*	0.88	1.03
		30/03/2020	**0089_MW125_200330**	**EP2003333**	0.08	0.07	0.40	<0.02	0.04	<0.02	<0.1	<0.02	0.07	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.44*	0.59	0.66
		15/07/2020	**0089_MW125_200715**	**EP2007382**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.01*	0.01	0.01
		22/09/2020	**0089_MW125_200922**	**EP2010151**	0.05	0.06	0.21	<0.02	0.04	<0.02	<0.1	<0.02	0.04	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.25*	0.34	0.40
		14/12/2020	**0089_MW125_201214**	**EP2013984**	0.09	0.08	0.38	<0.02	<0.01	<0.02	<0.1	<0.02	0.08	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.38*	0.55	0.63
		15/03/2021	**0089_MW125_210315**	**EP2102752**	0.14	0.12	0.43	<0.02	<0.01	<0.02	<0.1	0.02	0.11	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.43*	0.70	0.82
		8/06/2021	**0089_MW125_210608**	**EP2106448**	<0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		30/08/2021	**0089_MW125_210830**	**EP2110019**	0.06	0.07	0.26	<0.02	0.02	<0.02	<0.1	0.05	0.35	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.28*	0.39	0.46
		8/03/2017	**0089_MW126_S_170803**	**199045**	0.001	0.001	0.007	<0.001	0.01	<0.002	0.004	<0.002	0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW126_D_170920**	**176250**	<0.001	<0.001	0.004	<0.001	0.005	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/09/2017	**0089_MW126_S_170920**	**176250**	<0.001	<0.001	0.002	<0.001	0.005	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/10/2017	**0089_MW126_D_171018**	**178113**	0.001	<0.001	0.005	<0.001	0.009	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.02	<0.05	<0.2	<0.001	<0.001	<0.001	<0.005	<0.01	<0.02	<0.002	<0.02	<0.05	<0.002	<0.2			
		18/10/2017	**0089_MW126_S_171018**	**178113**	0.002	0.002	0.012	<0.001	0.019	<0.002	0.003	<0.002	0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.02	<0.05	<0.2	<0.001	0.002	<0.001	<0.005	<0.01	<0.02	<0.002	<0.02	<0.05	<0.002	<0.2			
		16/11/2017	**0089_MW126_D_171116**	**203411**	<0.001	<0.001	0.002	<0.001	0.009	<0.002	<0.004	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		16/11/2017	**0089_MW126_S_171116**	**203411**	<0.001	<0.001	0.003	<0.001	0.006	<0.002	<0.004	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		6/12/2017	**0089_MW126_D_171206**	**204243**	<0.001	<0.001	0.004	<0.001	0.006	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
Fire Training Area	**MW126**	**6/12/2017**	**0089_MW126_S_171206**	**204243**	0.001	<0.001	0.006	<0.001	0.005	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/01/2018	**0089_MW126_D_180118**	**205797**	<0.001	<0.001	0.004	<0.001	0.004	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/01/2018	**0089_MW126_S_180118**	**205797**	<0.001	<0.001	0.007	<0.001	0.006	<0.002	0.004	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_MW126_200108**	**EP2000179**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/03/2020	**0089_MW126_200331**	**EP2003364**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05

Table 1 Groundwater Analytical Results

					PFAS - Perfluoroalkyl Carboxylic Acids																PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																	*0.07*		
PFAS NEMP 2020 Interim Marine 99%									0.00023						19																			
PFAS NEMP 2020 Recreational Water															**10**																	**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																															
Demolition Ground	**MW137**	**17/01/2018**	**0089_MW137_D_1801117**	**205691**	0.003	0.008	0.36	0.034	0.20	<0.002	0.01	0.002	0.033	<0.001	0.004	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/01/2018	**0089_MW137_S_1801117**	**205691**	0.004	0.011	0.40	0.031	0.17	<0.002	0.01	0.003	0.038	<0.001	0.004	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	0.009	<0.01	<0.002	<0.05			
		1/02/2018	**0089_MW137_D_180201**	**206292**	0.003	0.011	0.51	0.042	0.25	<0.002	0.01	0.007	0.088	0.003	0.008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	**0089_MW137_I_180201**	**206292**	0.004	0.014	0.50	0.041	0.21	<0.002	0.020	0.008	0.094	0.004	0.008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	**0089_MW137_S_180201**	**206292**	0.003	0.011	0.54	0.034	0.19	<0.002	0.01	0.007	0.092	0.003	0.008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_MW137_200108**	**EP2000179**	0.04	0.09	1.45	0.03	0.16	<0.02	<0.1	<0.02	0.31	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.61*	1.97	2.09
		30/03/2020	**0089_MW137_200330**	**EP2003308**	0.04	0.06	1.26	0.05	0.21	<0.02	<0.1	<0.02	0.48	<0.02	0.08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.47*	2.12	2.23
		20/07/2020	**0089_MW137_200720**	**EP2007544**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	**0089_MW137_200923**	**EP2010220**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		14/12/2020	**0089_MW137_201214**	**EP2013975**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	**0089_MW137_210316**	**EP2102837**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	**0089_MW137_210608**	**EP2106464**	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
Demolition Ground	**MW139**	**30/10/2010**	**C24-MB01**	**EP1005976**					<0.02						<0.02																				
		18/10/2013	**WA0006_C24_MB01**	**EP1307981**					<0.02						<0.02							<0.1													
		26/05/2015	**C24_MB01**	**EP1510572**					0.13						0.16							<0.5	<0.5												
		29/09/2015	**C24_MB01**	**EP1514335**					0.05						<0.02							<0.1	<0.1												
		25/10/2016	**C24_MB01**	**521581**					<0.01						<0.01							<0.05													
		1/08/2017	**0089_MW139_S_170801**	**198918**	<0.001	<0.001	0.002	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/09/2017	**0089_MW139_D_170919**	**176140**	<0.001	<0.001	0.004	<0.001	0.012	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/09/2017	**0089_MW139_S_170919**	**176140**	<0.001	<0.001	0.002	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/10/2017	**0089_MW139_D_171017**	**177985**	<0.001	<0.001	0.004	<0.001	0.015	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.03	<0.002	<0.005	<0.05	<0.002	<0.05			
		17/10/2017	**0089_MW139_S_171017**	**177985**	<0.001	<0.001	0.002	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.03	<0.002	<0.005	<0.05	<0.002	<0.05			
		20/11/2017	**0089_MW139_D_171120**	**203545**	<0.001	<0.001	0.002	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		20/11/2017	**0089_MW139_S_171120**	**203545**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		4/12/2017	**0089_MW139_D_171204**	**204124**	<0.001	<0.001	0.002	<0.001	0.004	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002	<0.005	<0.02	<0.002	<0.05			
		4/12/2017	**0089_MW139_S_171204**	**204124**	<0.001	<0.001	0.002	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002	<0.005	<0.02	<0.002	<0.05			
		17/01/2018	**0089_MW139_D_1801117**	**205691**	<0.001	<0.001	0.008	<0.001	0.003	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/01/2018	**0089_MW139_S_1801117**	**205691**	<0.001	<0.001	0.009	<0.001	0.004	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	**0089_MW139_D_180201**	**206292**	<0.001	<0.001	0.005	<0.001	0.005	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	**0089_MW139_I_180201**	**206292**	<0.001	<0.001	0.004	<0.001	0.004	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	**0089_MW139_S_180201**	**206292**	<0.001	<0.001	0.006	<0.001	0.003	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_MW139_200108**	**EP2000179**	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		30/03/2020	**0089_MW139_200330**	**EP2003308**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	**0089_MW139_200720**	**EP2007544**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/09/2020	**0089_MW139_200922**	**EP2010151**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		14/12/2020	**0089_MW139_201214**	**EP2013983**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	**0089_MW139_210316**	**EP2102837**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	**0089_MW139_210608**	**EP2106464**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	**0089_MW139_210831**	**EP2110071**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Demolition Ground	**MW141**	**30/10/2010**	**C24-MB03**	**EP1005976**					12.6						*1.32*																				
		18/10/2013	**WA0006_C24_MB03**	**EP1307981**					62.5						*3.08*							<0.1													
		26/05/2015	**C24_MB03**	**EP1510572**					5.62						*0.66*							<0.5	<0.5												
		29/09/2015	**C24_MB03**	**EP1514335**					31.9						*2.16*							<0.5	<0.5												
		25/10/2016	**C24_MB03**	**521581**					31						0.66							<0.05													
		1/08/2017	**0089_MW141_S_170801**	**198918**	0.74	2.5	24	0.94	58	<0.002	0.53	2.9	27	0.81	*2.3*	0.015	0.006	<0.002	<0.005	<0.01	<0.05	<0.001	0.059	0.004	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/09/2017	**0089_MW141_D_170919**	**176140**	2.4	5.4	38	2.1	50	<0.002	0.86	1.8	32	0.64	*2.8*	0.030	0.005	<0.002	<0.005	<0.01	<0.05	<0.001	0.10	0.004	<0.001	0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/09/2017	**0089_MW141_S_170919**	**176140**	2.4	5.4	39	2.1	60	<0.002	0.87	1.8	36	0.63	*2.7*	0.024	0.005	<0.002	<0.005	<0.01	<0.05	<0.001	0.10	0.002	<0.001	0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/10/2017	**0089_MW141_D_171017**	**177985**	1.5	2.1	20	1.1	37	<0.02	0.45	2.2	18	0.53	*1.4*	0.014	<0.02	<0.02	<0.05	<0.1	<0.5	<0.010	0.031	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		17/10/2017	**0089_MW141_S_171017**	**177985**	2.0	3.4	34	1.4	87	<0.02	0.62	4.3	32	0.86	*2.6*	0.020	<0.02	<0.02	<0.05	<0.1	<0.5	<0.010	0.12	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		20/11/2017	**0089_MW141_D_171120**	**203545**	1.5	3.3	42	1.8	68	<0.1	0.79	4.1	37	1.2	*4.2*	<0.05	<0.1	<0.1	<0.2	<0.5	<2.5	<0.05	0.26	<0.05	<0.05	<0.5	<0.2	<0.1	<0.2	<0.5	<0.1	<2.5			
		20/11/2017	**0089_MW141_S_171120**	**203545**	1.8	3.8	47	1.9	69	<0.1	0.89	5.1	43	1.4	*4.4*	<0.05	<0.1	<0.1	<0.2	<0.5	<2.5	<0.05	0.19	<0.05	<0.05	<0.5	<0.2	<0.1	<0.2	<0.5	<0.1	<2.5			
		4/12/2017	**0089_MW141_D_171204**	**204124**	1.3	2.4	21	0.92	35	<0.04	0.58	1.4	19	0.51	*1.6*	<0.02	<0.04	<0.04	<0.1	<0.2	<1	<0.02	0.060	<0.02	<0.020	<0.2	<0.1	<0.04	<0.1	<0.2	<0.04	<1			
		4/12/2017	**0089_MW141_S_171204**	**204124**	1.6	4.2	33	1.3	44	<0.04	0.86	2.7	31	0.77	*2.9*	0.020	<0.04	<0.04	<0.1	<0.2	<1	<0.02	0.17	<0.02	<0.02	<0.2	<0.1	<0.04	<0.1	<0.2	<0.04	<1			
		17/01/2018	**0089_MW141_D_1801117**	**205691**	1.7	2.0	26	1.3	28	<0.002	0.82	2.2	27	1.0	*2.6*	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.080	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/01/2018	**0089_MW141_S_1801117**	**205691**	2.5	4.2	54	2.7	93	<0.002	1.6	5.0	65	1.9	*6.2*	0.070	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.24	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	**0089_MW141_D_180201**	**206292**	1.2	3.7	44	2.6	61	<0.02	0.84	2.4	31	0.86	*3.2*	<0.01	<0.02	<0.02	<0.05	<0.1	<0.05	<0.01	0.20	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		1/02/2018	**0089_MW141_I_180201**	**206292**	1.2	3.6	43	2.8	63	<0.02	0.86	2.4	30	0.94	*3.3*	<0.01	<0.02	<0.02	<0.05	<0.1	<0.05	<0.01	0.19	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		1/02/2018	**0089_MW141_S_180201**	**206292**	1.5	4.8	56	3.8	85	<0.02	1.1	3.4	45	1.3	*4.1*	<0.01	<0.02	<0.02	<0.05	<0.1	<0.05	<0.01	0.29	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		8/01/2020	**0089_MW141_200108**	**EP2000179**	1.25	1.46	19.4	0.72	52.1	<0.02	<0.2	1.36	15.1	0.36	*1.02*	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.12	<0.05	<0.05	0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***71.5***	90.7	93.0
		30/03/2020	**0089_MW141_200330**	**EP2003308**	0.54	0.95	14.3	1.18	50.0	<0.02	0.2	0.87	8.49	0.31	*1.19*	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***64.3***	75.9	78.0
		20/07/2020	**0089_MW141_200720**	**EP2007544**	0.48	1.52	16.7	1.28	45.7	<0.02	0.2	1.29	13.1	0.44	*1.71*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.06	<0.05	<0.05	0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***62.4***	79.7	82.5
		23/09/2020	**0089_MW141_200923**	**EP2010220**	0.70	1.50	18.2	1.88	59.9	<0.02	0.3	1.32	13.6	0.40	*1.71*	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***78.1***	96.1	99.6
		14/12/2020	**0089_MW141_201214**	**EP2013975**	0.59	1.06	10.3	1.01	39.8	<0.02	0.2	1.04	9.09	0.31	*1.10*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***50.1***	62.4	64.5
		16/03/2021	**0089_MW141_210316**	**EP2102837**	0.43	0.79	8.10	1.06	31.0	<0.02	0.2	0.69	5.86	0.23	*0.78*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***39.1***	47.3	49.1
		8/06/2021	**0089_MW141_210608**	**EP2106464**	0.38	0.76	10.8	0.79	34.9	<0.02	0.2	0.75	7.77	0.23	*0.91*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***45.7***	55.9	57.5
		31/08/2021	**0089_MW141_210831**	**EP2110071**	0.63	2.45	26.2	2.44	89.9	<0.02	0.4	1.64	16.1	0.58	*2.47*	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.08	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***116***	138	143
Demolition Ground	**MW142**	**1/08/2017**	**0089_MW142_S_170801**	**198918**	0.010	0.028	0.29	0.009	2.3	<0.002	0.009	0.01	0.13	0.005	0.020	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/09/2017	**0089_MW142_D_170919**	**176140**	0.034	0.048	0.72	0.008	2.1	<0.002	0.02	0.043	0.45	0.016	0.033	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/09/2017	**0089_MW142_S_170919**	**176140**	0.041	0.060	0.79	0.007	2.3	<0.002	0.021	0.048	0.57	0.019	0.029	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/10/2017	**0089_MW142_D_171017**	**177985**	0.033	0.062	0.52	0.020	1.6	<0.002	0.01	0.035	0.33	0.01	0.034	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.03	<0.002	<0.005	<0.05	<0.002	<0.05			
		17/10/2017	**0089_MW142_S_171017**	**177985**	0.032	0.060	0.53	0.013	1.4	<0.002	0.01	0.035	0.40	0.01	0.026	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.03	<0.002	<0.005	<0.05	<0.002	<0.05			
		20/11/2017	**0089_MW142_D_171120**	**203545**	0.037	0.070	0.60	0.002	1.2	<0.002	0.020	0.050	0.44	0.019	0.028	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		20/11/2017	**0089_MW142_S_171120**	**203545**	0.039	0.087	0.60	0.003	1.1	<0.002	0.020	0.053	0.54	0.026	0.029	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		4/12/2017	**0089_MW142_D_171204**	**204124**	0.028	0.053	0.79	0.012	1.7	<0.002	0.023	0.056	0.61	0.020	0.041	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.1	<0.002	<0.005	<0.2	<0.002	<0.05			
		4/12/2017	**0089_MW142_S_171204**	**204124**	0.042	0.082	1.0	0.016	1.6	<0.002	0.027	0.077	0.94	0.019	0.042	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.1	<0.002	<0.005	<0.2	<0.002	<0.05			
		17/01/2018	**0089_MW142_D_1801117**	**205691**	0.020	0.056	0.80	0.024	1.

					PFAS - Perfluoroalkyl Carboxylic Acids															PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																	*0.07*		
PFAS NEMP 2020 Interim Marine 99%									0.00023						19																			
PFAS NEMP 2020 Recreational Water															**10**																	**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																														
Demolition Ground	**MW149**	**20/11/2017**	**0089_MW149_S_171120**	**203545**	<0.001	<0.001	0.004	<0.001	0.003	<0.002	0.004	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		4/12/2017	**0089_MW149_D_171204**	**204124**	<0.001	<0.001	<0.001	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002	<0.005	<0.02	<0.002	<0.05			
		4/12/2017	**0089_MW149_S_171204**	**204124**	<0.001	<0.001	0.002	<0.001	0.003	<0.002	0.004	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002	<0.005	<0.02	<0.002	<0.05			
		17/01/2018	**0089_MW149_D_1801117**	**205691**	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/01/2018	**0089_MW149_S_1801117**	**205691**	0.002	<0.001	0.001	<0.001	0.007	<0.002	0.007	<0.002	0.003	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	**0089_MW149_D_180201**	**206292**	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	**0089_MW149_I_180201**	**206292**	<0.001	<0.001	0.001	<0.001	0.003	<0.002	0.004	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	**0089_MW149_S_180201**	**206292**	<0.001	<0.001	0.007	<0.001	0.007	<0.002	0.007	<0.002	0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_MW149_200108**	**EP2000179**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	**0089_MW149_200330**	**EP2003308**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	**0089_MW149_200720**	**EP2007544**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	**0089_MW149_200923**	**EP2010217**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	**0089_MW149_201214**	**EP2013983**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	**0089_MW149_210316**	**EP2102836**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	**0089_MW149_210608**	**EP2106464**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	**0089_MW149_210830**	**EP2110016**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Waste Water Treatment Plant	**MW158**	**7/08/2017**	**0089_MW158_S_170807**	**199149**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_MW158_200108**	**EP2000182**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.15	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.17	0.17
		31/03/2020	**0089_MW158_200331**	**EP2003364**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/07/2020	**0089_MW158_200721**	**EP2007594**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/09/2020	**0089_MW158_200921**	**EP2010093**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	**0089_MW158_201214**	**EP2013984**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/03/2021	**0089_MW158_210315**	**EP2102752**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		10/06/2021	**0089_MW158_210610**	**EP2106588**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	**0089_MW158_210830**	**EP2110020**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Waste Water Treatment Plant	**MW161**	**7/08/2017**	**0089_MW161_S_170807**	**199149**	0.022	0.019	0.28	0.027	6.1	<0.002	0.048	0.033	0.099	0.06	0.035	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.015	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/09/2017	**0089_MW161_S_170918**	**176030**	0.029	0.021	0.40	0.014	5.6	<0.002	0.063	0.092	0.098	0.072	0.030	0.010	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.011	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/10/2017	**0089_MW161_S_171019**	**178275**	0.11	0.084	0.70	0.064	8.7	<0.002	0.10	0.20	0.26	0.11	0.054	0.0099	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.015	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		15/11/2017	**0089_MW161_S_171115**	**203378**	0.049	0.040	0.71	0.12	8.6	<0.002	0.092	0.20	0.34	0.17	0.091	0.021	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.024	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		7/12/2017	**0089_MW161_S_171207**	**204323**	0.066	0.042	0.48	0.040	7.0	<0.002	0.12	0.18	0.29	0.13	0.064	0.020	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.018	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/01/2018	**0089_MW161_S_180116**	**205631**	0.076	0.063	0.64	0.063	7.2	<0.002	0.20	0.34	0.33	0.12	0.073	0.023	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.017	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_MW161_200108**	**EP2000182**	0.04	0.04	0.71	0.14	16.1	<0.02	0.1	0.45	0.37	0.10	0.10	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***16.8***	18.0	18.2
		1/04/2020	**0089_MW161_200401**	**EP2003417**	0.09	0.12	1.73	0.31	11.5	<0.02	<0.1	0.32	0.36	0.11	0.20	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***13.2***	14.3	14.7
		21/07/2020	**0089_MW161_200721**	**EP2007594**	0.07	0.11	2.53	0.42	10.5	<0.02	0.1	0.36	0.36	0.11	0.23	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***13.0***	14.3	14.8
		21/09/2020	**0089_MW161_200921**	**EP2010093**	0.06	0.05	1.70	0.22	10.6	<0.02	<0.1	0.32	0.27	0.09	0.17	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***12.3***	13.2	13.5
		14/12/2020	**0089_MW161_201214**	**EP2013992**	0.03	0.04	1.15	0.14	7.06	<0.02	<0.1	0.17	0.17	0.08	0.11	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***8.21***	8.77	8.97
		15/03/2021	**0089_MW161_210315**	**EP2102752**	0.05	0.05	0.81	0.11	7.16	<0.02	<0.1	0.21	0.17	0.06	0.08	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***7.97***	8.54	8.72
		10/06/2021	**0089_MW161_210610**	**EP2106588**	0.05	0.06	0.76	0.10	6.04	<0.02	<0.1	0.27	0.21	0.08	0.09	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***6.80***	7.50	7.68
		30/08/2021	**0089_MW161_210830**	**EP2110020**	0.04	0.02	0.50	0.08	5.09	<0.02	<0.1	0.20	0.16	0.08	0.08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***5.59***	6.15	6.25
Waste Water Treatment Plant	**MW166**	**7/08/2017**	**0089_MW166_S_170807**	**199149**	0.037	0.025	0.32	0.056	2	<0.002	0.072	0.073	0.13	0.054	0.067	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.021	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/09/2017	**0089_MW166_S_170918**	**176030**	0.049	0.020	0.44	0.058	2.1	<0.002	0.085	0.16	0.17	0.097	0.074	0.005	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.013	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/10/2017	**0089_MW166_S_171019**	**178275**	0.052	0.037	0.32	0.075	1.9	<0.002	0.074	0.17	0.17	0.076	0.087	0.005	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.016	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		15/11/2017	**0089_MW166_S_171115**	**203378**	0.053	0.043	0.41	0.087	1.7	<0.002	0.082	0.20	0.19	0.084	0.070	0.004	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.012	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		7/12/2017	**0089_MW166_S_171207**	**204323**	0.047	0.030	0.37	0.069	1.8	<0.002	0.092	0.17	0.21	0.090	0.064	0.003	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.011	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/01/2018	**0089_MW166_S_180116**	**205631**	0.052	0.031	0.54	0.089	2.0	<0.002	0.094	0.18	0.23	0.077	0.056	0.003	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.007	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_MW166_200108**	**EP2000182**	0.05	0.04	0.72	0.08	8.95	<0.02	0.1	0.26	0.25	0.09	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***9.67***	10.5	10.6
		1/04/2020	**0089_MW166_200401**	**EP2003417**	0.08	0.06	1.13	0.32	14.8	<0.02	<0.1	0.30	0.27	0.13	0.12	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***15.9***	16.8	17.2
		21/07/2020	**0089_MW166_200721**	**EP2007594**	0.07	0.08	1.89	0.49	14.1	<0.02	<0.1	0.29	0.35	0.12	0.16	0.03	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***16.0***	17.0	17.6
		22/09/2020	**0089_MW166_200922**	**EP2010151**	0.04	0.04	0.97	0.19	8.39	<0.02	<0.1	0.31	0.28	0.12	0.10	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***9.36***	10.2	10.4
		14/12/2020	**0089_MW166_201214**	**EP2013984**	0.02	0.02	0.47	0.05	7.53	<0.02	<0.1	0.22	0.20	0.12	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***8.00***	8.60	8.67
		10/06/2021	**0089_MW166_210610**	**EP2106588**	0.04	0.10	2.27	0.49	8.51	<0.02	0.1	0.34	0.37	0.17	0.16	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***10.8***	12.0	12.6
		30/08/2021	**0089_MW166_210830**	**EP2110019**	0.03	0.04	0.95	0.22	8.16	<0.02	<0.1	0.29	0.26	0.14	0.09	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***9.11***	9.92	10.2
Waste Water Treatment Plant	**MW171**	**7/08/2017**	**0089_MW171_S_170807**	**199149**	1.6	0.87	4.3	0.43	0.17	<0.002	0.7	0.44	2	0.11	0.23	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.008	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/09/2017	**0089_MW171_S_170918**	**176030**	1.7	1.2	4.1	0.22	0.23	<0.002	0.72	0.23	1.7	0.16	0.25	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.006	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/10/2017	**0089_MW171_S_171019**	**178275**	1.5	0.89	3.8	0.21	0.17	<0.002	0.64	0.48	2.0	0.095	0.22	0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.003	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		15/11/2017	**0089_MW171_S_171115**	**203378**	1.5	0.82	5.1	0.36	0.18	<0.002	0.63	0.40	2.1	0.16	0.24	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.005	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		7/12/2017	**0089_MW171_S_171207**	**204323**	2.1	1.4	3.7	0.23	0.29	<0.002	0.68	0.53	2.6	0.14	0.26	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.007	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/01/2018	**0089_MW171_S_180116**	**205631**	1.7	0.69	4.6	0.40	0.19	<0.002	0.88	0.60	2.5	0.20	0.22	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.004	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/04/2020	**0089_MW171_200401**	**EP2003417**	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		21/07/2020	**0089_MW171_200721**	**EP2007594**	0.03	<0.02	0.10	<0.02	0.45	<0.02	<0.1	0.06	0.06	0.04	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.07	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***0.55***	0.81	0.81
		14/12/2020	**0089_MW171_201214**	**EP2013992**	0.04	<0.02	0.06	<0.02	0.02	<0.02	<0.1	0.04	0.04	0.03	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***0.08***	0.23	0.23
		15/03/2021	**0089_MW171_210315**	**EP2102752**	0.07	0.03	0.15	<0.02	0.03	<0.02	<0.1	0.04	0.08	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***0.18***	0.37	0.40
		10/06/2021	**0089_MW171_210610**	**EP2106588**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	**0089_MW171_210830**	**EP2110019**	0.14	0.08	0.35	<0.02	<0.01	<0.02	<0.1	0.06	0.19	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***0.35***	0.74	0.82
Waste Water Treatment Plant	**MW172**	**7/08/2017**	**0089_MW172_S_170807**	**199149**	<0.001	<0.001	0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
Waste Water Treatment Plant	**MW173**	**9/08/2017**	**0089_MW173_S_170809**	**199252**	0.064	0.030	0.060	<0.001	0.002	<0.002	0.023	0.020	0.043	0.003	0.014	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/09/2017	**0089_MW173_S_170918**	**176030**	0.051	0.020	0.067	<0.001	0.003	<0.002	0.022	0.02	0.034	0.004	0.017	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/10/2017	**0089_MW173_S_171

Table 1 Groundwater Analytical Results

					PFAS - Perfluoroalkyl Carboxylic Acids																PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																	*0.07*		
PFAS NEMP 2020 Interim Marine 99%									0.00023						19																			
PFAS NEMP 2020 Recreational Water															**10**																	**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																														
Waste Water Treatment Plant	**MW196**	**22/07/2020**	**0089_MW196_200722**	**EP2007667**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		24/09/2020	**0089_MW196_200924**	**EP2010271**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/12/2020	**0089_MW196_201216**	**EP2014087**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		10/06/2021	**0089_MW196_210610**	**EP2106579**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	**0089_MW196_210830**	**EP2110019**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Waste Water Treatment Plant	**MW197**	**9/08/2017**	**0089_MW197_S_170809**	**199252**	0.002	0.001	0.008	<0.001	0.002	<0.002	0.002	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/09/2017	**0089_MW197_S_170918**	**176030**	<0.001	<0.001	<0.001	<0.001	0.003	<0.002	0.008	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/10/2017	**0089_MW197_S_171019**	**178275**	0.001	<0.001	0.002	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		15/11/2017	**0089_MW197_S_171115**	**203378**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		7/12/2017	**0089_MW197_S_171207**	**204323**	<0.001	<0.001	0.004	0.003	0.040	<0.002	0.002	<0.002	<0.001	<0.001	0.004	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/01/2018	**0089_MW197_S_180116**	**205631**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		31/03/2020	**0089_MW197_200331**	**EP2003374**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/07/2020	**0089_MW197_200715**	**EP2007382**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	**0089_MW197_210316**	**EP2102833**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		9/06/2021	**0089_MW197_210609**	**EP2106514**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/09/2021	**0089_MW197_210901**	**EP2110159**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Waste Water Treatment Plant	**MW199**	**8/08/2017**	**0089_MW199_S_170808**	**199212**	<0.001	<0.001	0.005	<0.001	0.006	<0.002	<0.002	<0.002	0.004	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/09/2017	**0089_MW199_S_170918**	**176030**	<0.001	<0.001	0.002	<0.001	0.003	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/10/2017	**0089_MW199_S_171019**	**178275**	<0.001	<0.001	0.001	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.1	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		15/11/2017	**0089_MW199_S_171115**	**203378**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		7/12/2017	**0089_MW199_S_171207**	**204323**	<0.001	<0.001	0.004	0.001	0.043	<0.002	0.003	<0.002	0.001	<0.001	0.002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/01/2018	**0089_MW199_S_180116**	**205631**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_MW199_200108**	**EP2000186**	<0.02	<0.02	0.03	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.08	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.12	0.12
		31/03/2020	**0089_MW199_200331**	**EP2003364**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		15/07/2020	**0089_MW199_200715**	**EP2007385**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/09/2020	**0089_MW199_200921**	**EP2010093**	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		16/12/2020	**0089_MW199_201216**	**EP2014087**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	**0089_MW199_210830**	**EP2110019**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Waste Water Treatment Plant	**MW200**	**9/08/2017**	**0089_MW200_S_170809**	**199252**	0.001	<0.001	0.004	<0.001	0.002	<0.002	<0.002	<0.002	0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.006	0.002	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		18/09/2017	**0089_MW200_S_170918**	**176030**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/10/2017	**0089_MW200_S_171019**	**178275**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.1	<0.001	<0.001	<0.001	<0.002	<0.01	<0.005	<0.002	<0.005	<0.02	<0.002	<0.05			
		15/11/2017	**0089_MW200_S_171115**	**203378**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		7/12/2017	**0089_MW200_S_171207**	**204323**	<0.001	<0.001	0.002	0.002	0.031	<0.002	<0.002	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/01/2018	**0089_MW200_S_180116**	**205631**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		9/01/2020	**0089_MW200_200109**	**EP2000249**	<0.02	<0.02	<0.02	<0.02	0.07	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.07	0.07	0.07
		31/03/2020	**0089_MW200_200331**	**EP2003374**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		15/07/2020	**0089_MW200_200715**	**EP2007382**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		24/09/2020	**0089_MW200_200924**	**EP2010273**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	**0089_MW200_201215**	**EP2014051**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	**0089_MW200_210316**	**EP2102833**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		9/06/2021	**0089_MW200_210609**	**EP2106514**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/09/2021	**0089_MW200_210901**	**EP2110159**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Waste Water Treatment Plant	**MW202**	**9/08/2017**	**0089_MW202_S_170809**	**199252**	0.041	0.019	0.024	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_MW203_200108**	**EP2000182**	0.03	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.03	0.03
		31/03/2020	**0089_MW203_200331**	**EP2003374**	0.03	0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.03	0.05
		15/07/2020	**0089_MW203_200715**	**EP2007385**	0.04	0.04	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.04	0.08
		22/09/2020	**0089_MW203_200922**	**EP2010141**	0.04	0.02	0.03	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.08	0.10
		16/12/2020	**0089_MW203_201216**	**EP2014087**	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		16/03/2021	**0089_MW203_210316**	**EP2102837**	<0.02	0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	0.02
		9/06/2021	**0089_MW203_210609**	**EP2106514**	<0.02	<0.02	0.09	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.11*	0.11	0.11
		30/08/2021	**0089_MW203_210830**	**EP2110019**	<0.02	0.02	0.09	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.09*	0.09	0.11
Helicopter Support Facility	**MW214**	**2/08/2017**	**0089_MW214_S_170802**	**198991**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/09/2021	**0089_MW214_210901**	**EP2110159**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Helicopter Support Facility	**MW215**	**2/08/2017**	**0089_MW215_S_170802**	**198991**	0.013	0.011	0.003	<0.001	<0.001	<0.002	0.005	<0.002	0.003	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/09/2021	**0089_MW215_210901**	**EP2110159**	0.03	0.03	0.35	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.35*	0.38	0.41
Helicopter Support Facility	**MW216**	**2/08/2017**	**0089_MW216_S_170802**	**198991**	0.40	0.76	4.2	0.023	0.058	<0.002	0.20	0.90	1.1	0.34	0.16	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.043	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		11/09/2017	**0089_MW216_S_170911**	**175533**	0.39	0.69	3.1	0.024	0.040	<0.002	0.23	0.96	1.1	0.28	0.12	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.028	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/10/2017	**0089_MW216_S_171016**	**177956**	0.26	0.46	2.2	0.012	0.028	<0.002	0.22	0.92	1.1	0.20	0.083	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.023	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/11/2017	**0089_MW216_S_171117**	**203443**	0.32	0.50	2.4	0.017	0.020	<0.002	0.21	0.94	1.2	0.23	0.072	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.004	<0.001	<0.001	<0.01	<0.05	<0.002	0.006	<0.1	<0.002	<0.05			
		5/12/2017	**0089_MW216_S_171205**	**204183**	0.43	0.76	2.5	0.027	0.024	<0.002	0.23	0.64	1.1	0.21	0.079	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.006	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		15/01/2018	**0089_MW216_S_180115**	**205568**	0.30	0.60	3.2	0.029	0.036	<0.002	0.21	0.77	1.0	0.26	0.093	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.018	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/12/2019	**0089_MW216_191219**	**EP1913598**	0.31	0.51	3.67	0.07	0.22	<0.02	0.4	1.43	1.13	0.25	0.17	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.22	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***3.89***	7.80	8.38
		31/03/2020	**0089_MW216_200331**	**EP2003366**	0.30	0.33	2.38	0.06	0.27	<0.02	0.6	4.14	1.79	0.29	0.22	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.35	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***2.65***	10.3	10.7
		22/07/2020	**0089_MW216_200722**	**EP2007667**	0.29	0.48	3.24	0.11	0.37	<0.02	0.5	2.50	1.57	0.25	0.24	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	1.18	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***3.61***	10.1	10.7
		15/12/2020	**0089_MW216_201215**	**EP2014041**	0.36	0.62	4.22	0.11	0.63	<0.02	0.8	4.78	2.88	0.37	0.26	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	1.32	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***4.85***	15.6	16.4
		18/03/2021	**0089_MW216_210318**	**EP2102955**	0.34	0.41	3.75	0.11	0.55	<0.02	0.9	2.88	2.07	0.33	0.30	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	2.17	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***4.30***	13.3	13.8
		9/06/2021	**0089_MW216_210609**	**EP2106514**	0.51	0.53	3.50	0.15	1.07	<0.02	0.9	3.57	1.85	0.38	0.39	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	3.81	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***4

					PFAS - Perfluoroalkyl Carboxylic Acids															PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																		*0.07*		
PFAS NEMP 2020 Interim Marine 99%									0.00023						19																				
PFAS NEMP 2020 Recreational Water															**10**																		**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																															
		11/09/2017	**0089_MW225_S_170911**	**175533**	<0.001	<0.001	0.001	<0.001	0.009	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/10/2017	**0089_MW225_S_171019**	**178275**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
Helicopter Support Facility	**MW225**	**17/11/2017**	**0089_MW225_S_171117**	**203443**	<0.001	<0.001	0.002	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		5/12/2017	**0089_MW225_S_171205**	**204183**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		15/01/2018	**0089_MW225_S_180115**	**205568**	<0.001	<0.001	0.001	<0.001	0.005	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/09/2021	**0089_MW225_210901**	**EP2110160**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		2/08/2017	**0089_MW226_S_170802**	**198991**	0.012	0.010	0.005	<0.001	0.001	<0.002	0.026	<0.002	0.006	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.011	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		11/09/2017	**0089_MW226_S_170911**	**175533**	0.005	<0.001	0.004	<0.001	<0.001	<0.002	0.003	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/10/2017	**0089_MW226_S_171019**	**178275**	0.002	<0.001	0.003	<0.001	0.002	<0.002	0.005	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/11/2017	**0089_MW226_S_171117**	**203443**	0.006	0.002	0.003	<0.001	<0.001	<0.002	<0.004	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		5/12/2017	**0089_MW226_S_171205**	**204183**	<0.005	<0.005	0.002	<0.001	<0.001	<0.002	0.006	<0.01	<0.005	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.005	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		15/01/2018	**0089_MW226_S_180115**	**205568**	0.002	0.001	0.002	<0.001	0.001	<0.002	0.020	<0.002	<0.001	0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
Helicopter Support Facility	**MW226**	**14/01/2020**	**0089_MW226_200114**	**EP2000432**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.48	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.48	0.48
		2/04/2020	**0089_MW226_200402**	**EP2003472**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/07/2020	**0089_MW226_200721**	**EP2007611**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/09/2020	**0089_MW226_200922**	**EP2010143**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	**0089_MW226_201215**	**EP2014042**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	**0089_MW226_210317**	**EP2102900**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		10/06/2021	**0089_MW226_210610**	**EP2106588**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	**0089_MW226_210831**	**EP2110071**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		2/08/2017	**0089_MW227_S_170802**	**198991**	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	0.009	0.033	0.017	0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	0.002	0.033	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		11/09/2017	**0089_MW227_S_170911**	**175533**	<0.001	<0.001	0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/10/2017	**0089_MW227_S_171019**	**178275**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/11/2017	**0089_MW227_S_171117**	**203443**	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.004	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		5/12/2017	**0089_MW227_S_171205**	**204183**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		15/01/2018	**0089_MW227_S_180115**	**205568**	<0.001	<0.001	<0.001	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
Helicopter Support Facility	**MW227**	**1/04/2020**	**0089_MW227_200401**	**EP2003417**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/07/2020	**0089_MW227_200722**	**EP2007648**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/09/2020	**0089_MW227_200921**	**EP2010085**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	**0089_MW227_201215**	**EP2014051**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/03/2021	**0089_MW227_210315**	**EP2102752**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		10/06/2021	**0089_MW227_210610**	**EP2106588**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	**0089_MW227_210831**	**EP2110071**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		2/08/2017	**0089_MW228_S_170802**	**198991**	0.002	<0.001	<0.001	<0.001	<0.001	<0.002	0.01	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		11/09/2017	**0089_MW228_S_170911**	**175533**	0.004	<0.001	<0.001	<0.001	0.004	<0.002	0.051	0.02	0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/10/2017	**0089_MW228_S_171019**	**178275**	0.003	<0.001	<0.001	<0.001	<0.001	<0.002	0.077	0.044	0.009	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/11/2017	**0089_MW228_S_171117**	**203443**	0.004	<0.001	<0.001	<0.001	<0.001	<0.002	0.11	0.041	0.009	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		5/12/2017	**0089_MW228_S_171205**	**204183**	0.007	0.001	<0.001	<0.001	<0.001	<0.002	0.20	0.089	0.020	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		15/01/2018	**0089_MW228_S_180115**	**205568**	0.002	<0.001	<0.001	<0.001	<0.001	<0.002	0.071	0.070	0.010	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
Helicopter Support Facility	**MW228**	**14/01/2020**	**0089_MW228_200114**	**EP2000432**	0.06	<0.02	<0.02	<0.02	<0.01	<0.02	1.1	12.0	11.0	1.42	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.50	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	26.1	26.1
		1/04/2020	**0089_MW228_200401**	**EP2003417**	0.11	0.04	0.03	<0.02	<0.01	<0.02	0.6	15.3	13.8	2.33	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	32.2	32.2
		22/07/2020	**0089_MW228_200722**	**EP2007648**	0.02	<0.02	<0.02	<0.02	<0.01	<0.02	1.1	5.89	4.89	0.40	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	12.3	12.3
		21/09/2020	**0089_MW228_200921**	**EP2010085**	0.06	<0.02	<0.02	<0.02	<0.01	<0.02	2.2	11.0	9.44	0.85	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	23.6	23.6
		15/12/2020	**0089_MW228_201215**	**EP2014047**	0.31	0.13	0.11	<0.02	<0.01	<0.02	4.2	14.0	15.0	3.42	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.06	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.11*	37.1	37.2
		15/03/2021	**0089_MW228_210315**	**EP2102752**	0.10	0.04	0.03	<0.02	<0.01	<0.02	2.0	9.40	8.86	1.16	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	21.6	21.6
		10/06/2021	**0089_MW228_210610**	**EP2106588**	0.07	<0.02	<0.02	<0.02	<0.01	<0.02	1.1	5.09	4.65	0.70	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	11.6	11.6
		31/08/2021	**0089_MW228_210831**	**EP2110071**	0.22	0.15	0.13	<0.02	<0.01	<0.02	2.3	10.4	10.4	2.55	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.40	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.13*	26.4	26.6
		8/08/2017	**0089_MW233_S_170808**	**199212**	0.011	0.016	0.21	0.002	0.2	<0.002	0.008	0.004	0.016	0.006	0.005	0.002	0.003	0.003	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		13/09/2017	**0089_MW233_S_170913**	**175739**	0.007	0.01	0.11	0.002	0.26	<0.002	0.008	0.007	0.016	0.008	0.006	<0.001	<0.002	0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/10/2017	**0089_MW233_S_171020**	**178263**	0.005	0.009	0.093	0.004	0.30	<0.002	0.005	0.004	0.011	0.005	0.011	<0.001	<0.002	0.003	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		21/11/2017	**0089_MW233_S_171121**	**203587**	0.013	0.020	0.14	0.005	0.33	<0.002	0.007	0.006	0.018	0.010	0.010	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		5/12/2017	**0089_MW233_S_171205**	**204183**	0.016	0.019	0.20	0.006	0.30	<0.002	0.01	0.006	0.020	0.009	0.010	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/01/2018	**0089_MW233_S_180119**	**205805**	0.013	0.013	0.11	0.007	0.53	0.002	0.020	0.020	0.043	0.020	0.040	0.002	<0.002	0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
AT storage, fuel farm and infiltration s	**MW233**	**8/01/2020**	**0089_MW233_200108**	**EP2000182**	<0.02	<0.02	0.13	<0.02	0.39	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.52*	0.52	0.52
		30/03/2020	**0089_MW233_200330**	**EP2003313**	<0.02	<0.02	0.07	<0.02	0.30	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.37*	0.37	0.37
		15/07/2020	**0089_MW233_200715**	**EP2007385**	<0.02	<0.02	0.11	<0.02	0.15	<0.02	<0.1	<0.02	<0.02	<0.02	**0.01**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.26*	0.27	0.27
		21/09/2020	**0089_MW233_200921**	**EP2010085**	<0.02	<0.02	0.12	<0.02	0.17	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.29*	0.29	0.29
		15/12/2020	**0089_MW233_201215**	**EP2014041**	<0.02	<0.02	0.14	<0.02	0.11	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.25*	0.25	0.25
		15/03/2021	**0089_MW233_210315**	**EP2102755**	<0.02	<0.02	0.10	<0.02	0.11	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.21*	0.21	0.21
		9/06/2021	**0089_MW233_210609**	**EP2106515**	<0.02	<0.02	0.08	<0.02	0.10	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.18*	0.18	0.18
		30/08/2021	**0089_MW233_210830**	**EP2110016**	<0.02	<0.02	0.07	<0.02	0.34	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.41*	0.41	0.41
		8/08/2017	**0089_MW236_S_170808**	**199212**	0.68	2	31	0.11	12	<0.002	0.2	0.23	2.3	1.2	*1.1*	1.3	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.01	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		13/09/2017	**0089_MW236_S_170913**	**175739**	1.8	4.6	32	0.23	12	<0.002	0.31	0.22	3.3	0.90	*1.1*	0.99	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.009	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/10/2017	**0089_MW236_S_171020**	**178263**	1.4	3.8	27	0.14	18	<0.02	0.24	0.58	3.9	1.2	*1.2*	1.2	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.50			
		21/11/2017	**0089_MW236_S_171121**	**203587**	1.6	4.1	26	0.26	16	<0.002	0.28	0.51	4.0	1.2	*0.99*	1.4	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.016	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		5/12/2017	**0089_MW236_S_171205**	**204183**	2.3	5.9	29	0.21	16	<0.020	0.33	0.40	4.2	0.88	*1.1*	1.9	<0.02	<0.02	<0.050	<0.1	<0.5	<0.01	0.016	<0.01	<0.01	<0.1	<0.01	<0.02	<0.05	<0.02	<0.02	<0.5			
		19/01/2018	**0089_MW236_S_180119**	**205805**	1.6	3.9	28	0.32	17	<0.02	0.37	0.40	4.1	1.7	*1.4*	2.5	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	0.028	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
AT storage, fuel farm and infiltration s	**MW236**	**2/04/2020**	**0089_MW236_200402**	**EP2003472**	0.15	0.42	19.8	0.50	67.7	<0.02	<0.1	0.19	0.82	0.42	*1.73*	3.16	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02

					PFAS - Perfluoroalkyl Carboxylic Acids															PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting				0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water														*0.56*																		*0.07*		
PFAS NEMP 2020 Interim Marine 99%								0.00023						19																				
PFAS NEMP 2020 Recreational Water														**10**																		**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																														
AT storage, fuel farm and infiltration s	MW243	13/09/2017	0089_MW243_S_170913	175739	0.002	<0.001	0.029	0.004	0.047	<0.002	0.002	<0.002	0.003	<0.001	0.006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/10/2017	0089_MW243_S_171020	178263	0.002	0.002	0.016	0.001	0.021	<0.002	<0.002	<0.002	0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		21/11/2017	0089_MW243_S_171121	203587	0.001	<0.001	0.006	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		5/12/2017	0089_MW243_S_171205	204183	0.001	<0.001	0.005	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002	<0.005	<0.02	<0.002	<0.05			
		19/01/2018	0089_MW243_S_180119	205805	0.001	0.002	0.044	0.027	0.83	<0.002	0.01	0.003	0.005	<0.001	0.008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		14/01/2020	0089_MW243_200114	EP2000432	<0.02	<0.02	0.03	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.09	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.12	0.12
		1/04/2020	0089_MW243_200401	EP2003438	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/07/2020	0089_MW243_200716	EP2007438	<0.02	<0.02	0.03	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.09*	0.10	0.10
		21/09/2020	0089_MW243_200921	EP2010077	<0.02	<0.02	0.04	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06
		15/12/2020	0089_MW243_201215	EP2014041	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		18/03/2021	0089_MW243_210318	EP2102955	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		10/06/2021	0089_MW243_210610	EP2106579	<0.02	<0.02	0.07	<0.02	0.70	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.77*	0.77	0.77
		31/08/2021	0089_MW243_210831	EP2110073	<0.02	<0.02	0.10	<0.02	0.43	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.53*	0.53	0.53
AT storage, fuel farm and infiltration s	MW245	4/08/2017	0089_MW245_S_170804	199095	<0.001	<0.001	0.19	0.017	0.62	<0.002	0.96	<0.002	0.033	<0.001	0.022	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		13/09/2017	0089_MW245_S_170913	175739	0.002	0.005	0.039	0.003	0.31	<0.002	<0.002	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/10/2017	0089_MW245_S_171020	178263	<0.010	<0.010	0.14	0.006	0.55	<0.020	<0.020	<0.020	0.015	<0.010	<0.010	<0.020	<0.020	<0.050	<0.10	<0.50	<0.010	0.001	<0.010	<0.010	<0.10	<0.05	<0.020	<0.050	<0.1	<0.020	<0.50			
		21/11/2017	0089_MW245_S_171121	203587	0.011	0.027	0.20	0.007	0.40	<0.002	0.22	<0.002	0.010	0.001	0.009	0.001	0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.003	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		5/12/2017	0089_MW245_S_171205	204183	<0.005	0.080	0.14	0.008	0.37	<0.002	<0.01	<0.01	0.041	<0.001	0.007	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.005	0.020	<0.001	<0.001	<0.01	<0.01	<0.002	<0.005	<0.02	<0.002	<0.05			
		19/01/2018	0089_MW245_S_180119	205805	0.005	0.007	0.078	0.004	0.22	<0.002	<0.02	<0.002	0.031	0.004	0.006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		14/01/2020	0089_MW245_200114	EP2000432	<0.02	<0.02	<0.02	<0.02	0.35	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.35*	0.35	0.35
		1/04/2020	0089_MW245_200401	EP2003438	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		16/07/2020	0089_MW245_200716	EP2007438	<0.02	<0.02	0.16	<0.02	0.18	<0.02	<0.1	<0.02	0.04	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.34*	0.38	0.38
		21/09/2020	0089_MW245_200921	EP2010077	<0.02	<0.02	0.12	<0.02	0.20	<0.02	<0.1	<0.02	0.04	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.32*	0.36	0.36
		15/12/2020	0089_MW245_201215	EP2014041	<0.02	<0.02	0.03	<0.02	0.15	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.18*	0.18	0.18
		18/03/2021	0089_MW245_210318	EP2102955	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.08*	0.08	0.08
		10/06/2021	0089_MW245_210610	EP2106579	<0.02	<0.02	0.05	<0.02	0.14	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.19*	0.19	0.19
		31/08/2021	0089_MW245_210831	EP2110073	<0.02	<0.02	0.03	<0.02	0.07	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.10*	0.10	0.10
AT storage, fuel farm and infiltration s	MW248	7/08/2017	0089_MW248_S_170807	199149	0.05	0.086	0.68	0.022	0.098	<0.002	0.026	<0.002	0.089	0.012	0.046	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		13/09/2017	0089_MW248_S_170913	175739	0.10	0.085	0.39	0.027	0.10	<0.002	<0.002	0.006	0.049	0.003	0.017	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/10/2017	0089_MW248_S_171020	178263	0.13	0.15	0.39	0.024	0.095	<0.002	<0.002	0.037	0.11	0.009	0.024	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		21/11/2017	0089_MW248_S_171121	203587	0.28	0.23	0.58	0.021	0.093	<0.002	<0.002	0.062	0.20	0.014	0.026	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		5/12/2017	0089_MW248_S_171205	204183	0.20	0.067	0.34	0.020	0.056	<0.002	<0.01	0.021	0.14	0.009	0.20	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.005	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002	<0.005	<0.02	<0.002	<0.05			
		19/01/2018	0089_MW248_S_180119	205805	0.12	0.14	0.53	0.031	0.081	<0.002	<0.02	0.041	0.18	0.022	0.027	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	0089_MW248_200108	EP2000182	0.12	0.12	0.90	0.05	2.22	<0.02	<0.1	<0.02	0.23	0.03	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***3.12***	3.56	3.73
		1/04/2020	0089_MW248_200401	EP2003438	<0.02	<0.02	0.16	<0.02	0.33	<0.02	<0.1	<0.02	0.03	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.49*	0.53	0.53
		22/07/2020	0089_MW248_200722	EP2007667	0.18	0.24	1.70	0.11	1.77	<0.02	<0.1	0.05	0.45	0.06	0.13	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***3.47***	4.34	4.69
		21/09/2020	0089_MW248_200921	EP2010077	0.23	0.15	0.86	0.02	1.19	<0.02	<0.1	<0.02	0.11	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***2.05***	2.42	2.59
		15/12/2020	0089_MW248_201215	EP2014041	0.17	0.15	0.99	0.03	0.47	<0.02	<0.1	<0.02	0.18	0.04	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.46*	1.91	2.09
		18/03/2021	0089_MW248_210318	EP2102954	0.15	0.12	1.34	0.05	0.44	<0.02	0.8	0.04	0.30	0.05	0.10	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.78*	3.22	3.39
		9/06/2021	0089_MW248_210609	EP2106516	0.19	0.18	1.48	0.09	0.66	<0.02	<0.1	<0.02	0.25	0.06	0.13	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***2.14***	2.77	3.04
AT storage, fuel farm and infiltration s	MW249	7/08/2017	0089_MW249_S_170807	199149	0.014	0.065	1.8	0.012	0.45	<0.002	<0.002	<0.002	0.15	0.017	0.079	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		13/09/2017	0089_MW249_S_170913	175739	0.015	0.052	1.7	0.014	0.57	<0.002	0.004	0.008	0.14	0.024	0.052	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/10/2017	0089_MW249_S_171020	178263	0.011	0.060	1.4	0.044	0.57	<0.002	0.004	0.01	0.13	0.014	0.083	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	0.004	0.004	<0.01	<0.05	<0.002	<0.005	<0.01	<0.002	<0.05			
		21/11/2017	0089_MW249_S_171121	203587	0.010	0.040	1.4	0.021	0.39	<0.002	0.003	0.007	0.10	0.011	0.060	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		5/12/2017	0089_MW249_S_171205	204183	0.012	0.042	1.4	0.021	0.50	<0.002	0.004	0.009	0.13	0.010	0.069	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002	<0.005	<0.02	<0.002	<0.05			
		19/01/2018	0089_MW249_S_180119	205805	0.007	0.030	0.60	0.020	0.21	<0.002	<0.002	0.004	0.061	0.005	0.026	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	0089_MW249_200108	EP2000182	<0.02	<0.02	0.28	<0.02	0.16	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.44*	0.44	0.44
		30/03/2020	0089_MW249_200330	EP2003313	<0.02	<0.02	0.12	<0.02	0.07	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.19*	0.19	0.19
		16/07/2020	0089_MW249_200716	EP2007438	<0.02	<0.02	0.07	<0.02	0.09	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.16*	0.16	0.16
		21/09/2020	0089_MW249_200921	EP2010077	<0.02	0.03	0.80	<0.02	0.49	<0.02	<0.1	<0.02	0.03	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.29*	1.35	1.38
		15/12/2020	0089_MW249_201215	EP2014041	<0.02	<0.02	0.15	<0.02	0.15	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.30*	0.30	0.30
		15/03/2021	0089_MW249_210315	EP2102755	<0.02	<0.02	0.11	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.17*	0.17	0.17
		9/06/2021	0089_MW249_210609	EP2106515	<0.02	<0.02	0.14	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.22*	0.22	0.22
		31/08/2021	0089_MW249_210831	EP2110071	<0.02	<0.02	0.13	<0.02	0.14	<0.02	<0.1	<0.02	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.27*	0.29	0.29
station, dredge soil and ship sullage a	MW255	4/08/2017	0089_MW255_S_170804	199095	0.71	1.0	1.0	0.031	1.1	<0.002	0.16	0.23	1.4	0.10	0.043	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		13/09/2017	0089_MW255_S_170913	175739	1.6	1.4	0.85	0.015	1.2	<0.002	0.27	0.17	1.7	0.097	0.039	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/10/2017	0089_MW255_S_171020	178263	1.6	1.0	0.60	0.016	1.0	<0.002	0.34	0.74	2.6	0.093	0.045	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		21/11/2017	0089_MW255_S_171121	203587	2.5	1.5	0.70	0.019	0.76	<0.002	0.46	0.84	3.7	0.086	0.036	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/12/2017	0089_MW255_S_171208	204353	2.4	1.9	0.64	0.014	1.3	<0.002	0.46	0.70	4.2	0.098	0.044	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.004	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/01/2018	0089_MW255_S_180119	205805	2.1	1.2	0.71	0.020	0.90	<0.002	0.40	0.63	4.0	0.11	0.043	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/07/2020	0089_MW255_200716	EP2007438	0.09	0.19	1.26	<0.02	0.78	<0.02	<0.1	0.07	0.30	0.06	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***2.04***	2.59	2.78
		22/09/2020	0089_MW255_200922	EP2010141	0.45	1.54	14.2	0.05	1.13	<0.02	0.1	0.24	1.55	0.63	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***15.3***	18.4	20.0
		16/12/2020	0089_MW255_201216	EP2014106	0.10	0.22	2.44	<0.02	0.94	<0.02	<0.1	0.07	0.31	0.12	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***3.38***	4.00	4.22
		17/03/2021	0089_MW255_210317	EP2102900	0.10	0.07	1.05	<0.02	0.65	<0.02	<0.1	0.04	0.19	0.03	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.70*	2.08	2.15
		10/06/2021	0089_MW255_210610	EP2106580	0.07	0.08	1.15	<0.02	0.53	<0.02	<0.1	0.04	0.17	0.04	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.68*	2.06	2.14
		31/08/2021	0089_MW255_210831	EP2110073	0.12	0.47	6.89	0.02	0.90	<0.02	<0.1	0.08	0.44	0.19	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***7.79***	8.65	9.14
station, dredge soil and ship sullage a	MW256	4/08/2017	0089_MW256_S_170804	199095	0.042	0.043	0.49	0.028	4.8	<0.002	0.049	0.080	0.20	0.063	0.095	0.006	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.008	<0.001	<0.001	0.06	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		13/09/2017	0089_MW256_S_170913	175739	0.059	0.035	0.49	0.017	4.5	<0.002	0.062	0.077	0.16	0.068	0.093

					PFAS - Perfluoroalkyl Carboxylic Acids																PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting				0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water														*0.56*																		*0.07*		
PFAS NEMP 2020 Interim Marine 99%								0.00023						19																				
PFAS NEMP 2020 Recreational Water														**10**																		**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																														
station, dredge soil and ship sullage a	MW261	25/10/2019	0089_MW261_191025	EP1911020	<0.02	<0.02	0.09	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.09*	0.09	0.09
		19/12/2019	0089_MW261_191219	EP1913595	<0.02	0.02	0.16	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.16*	0.16	0.18
		30/03/2020	0089_MW261_200330	EP2003313	<0.02	<0.02	0.16	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.16*	0.16	0.16
		21/07/2020	0089_MW261_200721	EP2007611	<0.02	0.02	0.19	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.19*	0.19	0.21
		22/09/2020	0089_MW261_200922	EP2010141	0.03	<0.02	0.46	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.46*	0.49	0.49
		16/12/2020	0089_MW261_201216	EP2014087	<0.02	<0.02	0.23	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.23*	0.23	0.23
		18/03/2021	0089_MW261_210318	EP2102954	0.03	<0.02	0.26	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.26*	0.29	0.29
		9/06/2021	0089_MW261_210609	EP2106516	<0.02	<0.02	0.11	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.11*	0.11	0.11
		31/08/2021	0089_MW261_210831	EP2110073	<0.02	<0.02	0.13	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.13*	0.13	0.13
station, dredge soil and ship sullage a	MW264	1/08/2017	0089_MW264_S_170801	198918	0.037	0.008	0.063	0.003	1.5	<0.002	0.007	0.009	0.034	0.004	0.005	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/09/2017	0089_MW264_S_170919	176140	0.036	0.004	0.078	0.006	0.96	<0.002	0.009	0.01	0.029	0.004	0.007	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/10/2017	0089_MW264_S_171016	177956	0.084	0.007	0.051	0.003	0.97	<0.002	0.01	0.01	0.039	0.003	0.005	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/11/2017	0089_MW264_S_171117	203443	0.057	0.006	0.054	0.005	0.90	<0.002	0.008	0.01	0.033	0.003	0.006	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.004	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		7/12/2017	0089_MW264_S_171207	204323	0.033	0.005	0.060	0.004	0.64	<0.002	0.007	0.007	0.022	0.003	0.007	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/01/2018	0089_MW264_S_180116	205631	0.063	0.005	0.028	0.006	1.1	<0.002	0.005	0.008	0.034	0.001	0.004	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/12/2019	0089_MW264_191219	EP1913595	<0.02	<0.02	0.05	<0.02	2.50	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	**0.11**	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***2.55***	2.66	2.66
		30/03/2020	0089_MW264_200330	EP2003313	<0.02	<0.02	0.05	<0.02	1.30	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.35*	1.35	1.35
		16/07/2020	0089_MW264_200716	EP2007438	<0.02	<0.02	0.04	<0.02	1.37	<0.02	<0.1	<0.02	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.41*	1.43	1.43
		22/09/2020	0089_MW264_200922	EP2010141	<0.02	<0.02	0.10	<0.02	0.89	<0.02	<0.1	0.02	0.03	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.99*	1.05	1.05
		14/12/2020	0089_MW264_201214	EP2013975	<0.02	<0.02	0.03	<0.02	1.38	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.41*	1.41	1.41
		18/03/2021	0089_MW264_210318	EP2102954	<0.02	<0.02	0.05	<0.02	1.30	<0.02	<0.1	0.02	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.35*	1.39	1.39
		9/06/2021	0089_MW264_210609	EP2106515	<0.02	<0.02	0.06	<0.02	1.19	<0.02	<0.1	0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.25*	1.27	1.27
		31/08/2021	0089_MW264_210831	EP2110073	<0.02	<0.02	0.10	<0.02	0.44	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.54*	0.54	0.54
station, dredge soil and ship sullage a	MW268	1/08/2017	0089_MW268_S_170801	198918	0.094	0.11	0.35	<0.001	<0.001	<0.002	0.005	<0.002	0.052	0.003	0.002	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/09/2017	0089_MW268_S_170919	176140	0.085	0.11	0.44	<0.001	0.005	<0.002	0.008	0.003	0.053	0.005	0.003	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/10/2017	0089_MW268_S_171016	177956	0.085	0.11	0.40	<0.001	0.002	<0.002	0.008	0.003	0.046	0.003	0.002	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/11/2017	0089_MW268_S_171117	203443	0.094	0.13	0.41	<0.001	0.002	<0.002	0.009	0.003	0.060	0.004	0.002	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.004	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		7/12/2017	0089_MW268_S_171207	204323	0.13	0.18	0.40	<0.001	0.031	<0.002	0.01	0.004	0.054	0.002	0.003	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/01/2018	0089_MW268_S_180116	205631	0.080	0.13	0.40	0.002	<0.001	<0.002	0.009	0.004	0.068	0.004	0.002	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/12/2019	0089_MW268_191219	EP1913595	0.10	0.12	0.76	<0.02	0.04	<0.02	<0.1	<0.02	0.08	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.14	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.80*	1.12	1.24
		30/03/2020	0089_MW268_200330	EP2003313	0.08	0.11	0.49	<0.02	<0.01	<0.02	<0.1	<0.02	0.07	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.49*	0.64	0.75
		21/07/2020	0089_MW268_200721	EP2007611	0.07	0.12	0.39	<0.02	<0.01	<0.02	<0.1	<0.02	0.10	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.39*	0.56	0.68
		21/09/2020	0089_MW268_200921	EP2010085	0.08	0.09	0.37	<0.02	<0.01	<0.02	<0.1	<0.02	0.06	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.37*	0.51	0.60
		14/12/2020	0089_MW268_201214	EP2013975	0.03	0.04	0.20	<0.02	<0.01	<0.02	<0.1	<0.02	0.03	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.20*	0.26	0.30
		16/03/2021	0089_MW268_210316	EP2102837	0.05	0.06	0.30	<0.02	<0.01	<0.02	<0.1	<0.02	0.05	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.30*	0.40	0.46
		9/06/2021	0089_MW268_210609	EP2106515	0.05	0.09	0.28	<0.02	<0.01	<0.02	<0.1	<0.02	0.06	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.28*	0.39	0.48
		31/08/2021	0089_MW268_210831	EP2110073	0.06	0.09	0.41	<0.02	<0.01	<0.02	<0.1	<0.02	0.04	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.41*	0.51	0.60
station, dredge soil and ship sullage a	MW269	1/08/2017	0089_MW269_S_170801	198918	0.015	0.013	0.094	0.002	0.27	<0.002	0.006	0.01	0.023	0.002	0.002	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/09/2017	0089_MW269_S_170919	176140	0.027	0.021	0.30	0.003	0.29	<0.002	0.01	0.020	0.054	0.011	0.006	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/10/2017	0089_MW269_S_171016	177956	0.041	0.040	0.34	0.002	0.27	<0.002	0.01	0.022	0.063	0.01	0.009	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/11/2017	0089_MW269_S_171117	203443	0.031	0.042	0.40	0.006	0.27	<0.002	0.01	0.021	0.052	0.006	0.006	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.1	<0.002	<0.05			
		7/12/2017	0089_MW269_S_171207	204323	0.012	0.009	0.082	0.002	0.18	<0.002	0.006	0.007	0.016	0.002	0.005	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		16/01/2018	0089_MW269_S_180116	205631	0.032	0.034	0.31	0.010	0.24	<0.002	0.01	0.024	0.060	0.007	0.007	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/12/2019	0089_MW269_191219	EP1913595	0.10	0.14	0.53	<0.02	1.03	<0.02	<0.1	0.04	0.20	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.30	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.56*	2.21	2.35
		30/03/2020	0089_MW269_200330	EP2003313	0.08	0.11	0.44	<0.02	0.67	<0.02	<0.1	0.04	0.14	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.11*	1.37	1.48
		21/07/2020	0089_MW269_200721	EP2007611	0.05	0.10	0.31	<0.02	0.51	<0.02	<0.1	0.02	0.13	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.82*	1.02	1.12
		21/09/2020	0089_MW269_200921	EP2010085	0.07	0.10	0.39	<0.02	0.65	<0.02	<0.1	0.02	0.13	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.04*	1.27	1.37
		14/12/2020	0089_MW269_201214	EP2013975	0.04	0.06	0.30	<0.02	0.35	<0.02	<0.1	0.02	0.08	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.65*	0.79	0.85
		16/03/2021	0089_MW269_210316	EP2102837	0.06	0.10	0.59	<0.02	0.48	<0.02	<0.1	0.03	0.12	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.07*	1.29	1.39
		9/06/2021	0089_MW269_210609	EP2106515	0.09	0.13	0.60	<0.02	0.45	<0.02	<0.1	0.03	0.13	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.05*	1.31	1.44
		31/08/2021	0089_MW269_210831	EP2110073	0.07	0.10	0.59	<0.02	0.41	<0.02	<0.1	0.03	0.14	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*1.00*	1.25	1.35
Demolition Ground	MW272	1/08/2017	0089_MW272_S_170801	198918	<0.001	<0.001	0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/09/2017	0089_MW272_D_170919	176140	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.002	<0.002	0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		19/09/2017	0089_MW272_S_170919	176140	<0.001	<0.001	0.003	<0.001	0.004	<0.002	<0.002	<0.002	0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/10/2017	0089_MW272_D_171017	177985	<0.001	<0.001	0.001	<0.001	0.001	<0.002	0.005	0.002	0.003	0.002	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.03	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/10/2017	0089_MW272_S_171017	177985	<0.001	<0.001	0.001	<0.001	0.001	<0.002	0.006	0.002	0.003	0.002	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		20/11/2017	0089_MW272_D_171120	203545	<0.001	<0.001	0.004	<0.001	0.005	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.05	<0.002	<0.005	<0.1	<0.002	<0.05			
		20/11/2017	0089_MW272_S_171120	203545	<0.001	<0.001	0.005	<0.001	0.016	<0.002	<0.002	<0.002	0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.1	<0.002	<0.05			
		4/12/2017	0089_MW272_D_171204	204124	<0.001	<0.001	0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002	<0.005	<0.02	<0.002	<0.05			
		4/12/2017	0089_MW272_S_171204	204124	<0.001	<0.001	0.002	<0.001	0.001	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002	<0.005	<0.02	<0.002	<0.05			
		17/01/2018	0089_MW272_D_1801117	205691	<0.001	<0.001	0.001	<0.001	0.002	<0.002	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		17/01/2018	0089_MW272_S_1801117	205691	<0.001	<0.001	0.001	<0.001	0.002	<0.002	0.004	<0.002	0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	0089_MW272_D_180201	206292	<0.001	<0.001	0.002	<0.001	0.002	<0.002	0.004	<0.002	0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	0089_MW272_I_180201	206292	<0.001	<0.001	0.002	<0.001	0.002	<0.002	0.004	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		1/02/2018	0089_MW272_S_180201	206292	<0.001	<0.001	0.003	<0.001	0.004	<0.002	0.006	<0.002	0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	0089_MW272_200108	EP2000179	<0.02	<0.02	<0.02	<0.02	0.10	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.10*	0.10	0.10
		30/03/2020	0089_MW272_200330	EP2003308	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.

Table 1 Groundwater Analytical Results

					PFAS - Perfluoroalkyl Carboxylic Acids																PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																		*0.07*		
PFAS NEMP 2020 Interim Marine 99%									0.00023						19																				
PFAS NEMP 2020 Recreational Water															**10**																		**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																															
station, dredge soil and ship sullage a	**MW517**	**16/07/2020**	**0089_MW250_200716**	**EP2007438**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		22/09/2020	**0089_MW517_200922**	**EP2010141**	<0.02	<0.02	<0.02	<0.02	0.10	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.10*	0.10	0.10
		15/12/2020	**0089_MW517_201215**	**EP2014041**	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		18/03/2021	**0089_MW517_210318**	**EP2102954**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		9/06/2021	**0089_MW517_210609**	**EP2106516**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	**0089_MW517_210831**	**EP2110064**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
station, dredge soil and ship sullage a	**MW518**	**30/03/2020**	**0089_MW260_200330**	**EP2003313**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		21/07/2020	**0089_MW260_200721**	**EP2007611**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/09/2020	**0089_MW518_200922**	**EP2010141**	0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.04	0.04
		16/12/2020	**0089_MW518_201216**	**EP2014092**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		18/03/2021	**0089_MW518_210318**	**EP2102954**	0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.04	0.04
		9/06/2021	**0089_MW518_210609**	**EP2106515**	<0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		31/08/2021	**0089_MW518_210831**	**EP2110073**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Drinking Water

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
		12/01/2017	E06_MW43_170112	530261										2,100					
		26/09/2019	0089_MW010_190926	679542				430											
		25/10/2019	0089_MW010_191025	EP1911020									172						
	MW010	16/12/2020	0089_MW010_201216	EP2014092	<1	451	<1	451	28.0	24.9	600	5.72	98	1,440	48	112	65	24	308
		18/03/2021	0089_MW010_210318	EP2102954	<1	396	<1	396	27.8	26.7	605	2.05	136	1,510	24	109	62	26	356
		9/06/2021	0089_MW010_210609	EP2106516	<1	431	<1	431	46.0	47.4	1,160	1.46	224	2,600	32	84	107	51	760
		31/08/2021	0089_MW010_210831	EP2110073	<1	474	<1	474	40.0	37.7	961	2.89	163			86	87	41	580
		8/03/2017	0089_MW109_S_170803	199045		250					79	3.6				97	20	2.1	39
		20/09/2017	0089_MW109_D_170920	176250															
		20/09/2017	0089_MW109_S_170920	176250															
		18/10/2017	0089_MW109_D_171018	178113															
		18/10/2017	0089_MW109_S_171018	178113															
		16/11/2017	0089_MW109_D_171116	203411															
		16/11/2017	0089_MW109_S_171116	203411															
		6/12/2017	0089_MW109_D_171206	204243															
		6/12/2017	0089_MW109_S_171206	204243															
Fire Training Area	MW109	18/01/2018	0089_MW109_D_180118	205797															
		18/01/2018	0089_MW109_S_180118	205797															
		16/12/2019	0089_MW109_191216	EP1913380	<1	297	<1	297	7.99	8.28	56	1.78	23	434	1,040	103	18	2	37
		30/03/2020	0089_MW109_200330	EP2003333	<1	361	<1	361	10.7	11.2	108	2.16	23	589	831	125	26	2	64
		15/07/2020	0089_MW109_200715	EP2007385	<1	319	<1	319	8.62	8.32	64	1.76	21	459	44	102	18	2	39
		21/09/2020	0089_MW109_200921	EP2010093	<1	298	<1	298	8.03	7.99	55	0.23	25	423	74	98	18	2	36
		14/12/2020	0089_MW109_201214	EP2013984	<1	278	<1	278	7.34	7.23	44	0.76	26	412	127	89	16	3	32
		16/03/2021	0089_MW109_210316	EP2102833	<1	434	<1	434	15.6	15.1	227	1.54	26	835	26	121	45	2	123
		8/06/2021	0089_MW109_210608	EP2106448	<1	344	<1	344	10.0	10.1	96	0.62	21	544	408	106	24	2	65
		30/08/2021	0089_MW109_210830	EP2110020	<1	278	<1	278	8.51	8.58	84	0.43	28			96	19	2	50
		30/10/2010	DS3-MB01	EP1005976															
		22/10/2013	WA0001_D53_MB01	EP1308039															
		26/05/2015	D53_MB01	EP1510572															
		29/09/2015	WA0001_MB01	EP1514335															
		23/02/2016	D53_MB01	EP1601568															
		25/10/2016	D53_MB01	521581															
		8/03/2017	0089_MW112_S_170803	199045		180					29	6.4				78	8.9	1.3	17
		20/09/2017	0089_MW112_D_170920	176250															
		20/09/2017	0089_MW112_S_170920	176250															
		18/10/2017	0089_MW112_D_171018	178113															
		18/10/2017	0089_MW112_S_171018	178113															
		16/11/2017	0089_MW112_D_171116	203411															
Fire Training Area	MW112	16/11/2017	0089_MW112_S_171116	203411															
		6/12/2017	0089_MW112_D_171206	204243															
		6/12/2017	0089_MW112_S_171206	204243															
		18/01/2018	0089_MW112_D_180118	205797															
		18/01/2018	0089_MW112_S_180118	205797															
		8/01/2020	0089_MW112_200108	EP2000179	<1	185	<1	185	5.18	5.88	37	6.34	21	290	36	83	10	<1	21
		30/03/2020	0089_MW112_200330	EP2003333	<1	187	<1	187	5.04	5.77	36	6.72	14	288	118	79	9	<1	25
		15/07/2020	0089_MW112_200715	EP2007385	<1	315	<1	315	8.41	7.03	41	8.92	46	432	84	97	13	3	24
		21/09/2020	0089_MW112_200921	EP2010093	<1	219	<1	219	5.73	5.79	31	0.50	23	336	249	79	11	1	21
		14/12/2020	0089_MW112_201214	EP2013984	<1	241	<1	241	6.32	5.47	34	7.14	26	344	250	73	10	2	22
		16/03/2021	0089_MW112_210316	EP2102833	<1	211	<1	211	6.02	6.54	38	4.19	35	396	406	88	12	3	25
		8/06/2021	0089_MW112_210608	EP2106448	<1	228	<1	228	6.13	6.15	33	0.14	31	362	316	84	11	2	23
		30/08/2021	0089_MW112_210830	EP2110020	<1	222	<1	222	5.73	5.77	32	0.29	19			82	10	1	19
		30/10/2010	DS3-MB02	EP1005976															
		22/10/2013	WA0001_D53_MB02	EP1308039															
		26/05/2015	D53_MB02	EP1510572															
		29/09/2015	WA0001_MB02	EP1514335															
		23/02/2016	D53_MB02	EP1601568															
		25/10/2016	D53_MB02	521581															
		8/03/2017	0089_MW117_S_170803	199045		360					30	4.1				150	16	2.5	21
		20/09/2017	0089_MW117_D_170920	176250															
		20/09/2017	0089_MW117_S_170920	176250															
		18/10/2017	0089_MW117_D_171018	178113															
		18/10/2017	0089_MW117_S_171018	178113															
		16/11/2017	0089_MW117_D_171116	203411															
Fire Training Area	MW117	16/11/2017	0089_MW117_S_171116	203411															
		6/12/2017	0089_MW117_D_171206	204243															
		6/12/2017	0089_MW117_S_171206	204243															
		18/01/2018	0089_MW117_D_180118	205797															
		18/01/2018	0089_MW117_S_180118	205797															
		16/12/2019	0089_MW117_191216	EP1913380	<1	440	<1	440	10.2	10.3	32	0.38	26	566	200	149	20	4	26
		30/03/2020	0089_MW117_200330	EP2003333	<1	368	<1	368	8.90	10.1	35	6.45	27	600	2,890	150	18	3	25
		15/07/2020	0089_MW117_200715	EP2007385	<1	500	<1	500	11.6	11.7	38	0.23	28	652	623	175	20	4	28
		21/09/2020	0089_MW117_200921	EP2010093	<1	404	<1	404	9.64	10.2	35	2.76	28	550	313	147	20	3	26
		14/12/2020	0089_MW117_201214	EP2013992	<1	408	<1	408	9.76	10.7	34	4.67	31	525	222	160	19	3	25
		16/03/2021	0089_MW117_210316	EP2102833	<1	401	<1	401	9.71	10.0	36	1.63	33	604	1,250	149	18	3	24
		8/06/2021	0089_MW117_210608	EP2106448	<1	454	<1	454	10.8	10.1	36	3.55	37	626	352	150	18	4	24
		30/08/2021	0089_MW117_210830	EP2110020	<1	291	<1	291	7.22	7.37	36	0.97	19			101	14	<1	27
		8/03/2017	0089_MW120_S_170803	199045		230					58	4				80	23	2.2	28
		20/09/2017	0089_MW120_D_170920	176250															
		20/09/2017	0089_MW120_S_170920	176250															
		18/10/2017	0089_MW120_D_171018	178113															
		18/10/2017	0089_MW120_S_171018	178113															
		16/11/2017	0089_MW120_D_171116	203411															
		16/11/2017	0089_MW120_S_171116	203411															
		6/12/2017	0089_MW120_D_171206	204243															
Fire Training Area	MW120	6/12/2017	0089_MW120_S_171206	204243															
		18/01/2018	0089_MW120_D_180118	205797															
		18/01/2018	0089_MW120_S_180118	205797															
		16/12/2019	0089_MW120_191216	EP1913380	<1	262	<1	262	6.64	7.02	35	2.76	20	407	218	84	17	3	31
		30/03/2020	0089_MW120_200330	EP2003333	<1	221	<1	221	5.98	7.24	40	9.50	21	370	42	86	19	3	30
		15/07/2020	0089_MW120_200715	EP2007385	<1	245	<1	245	6.53	6.78	41	1.92	23	376	86	82	17	3	28
		14/12/2020	0089_MW120_201214	EP2013984	<1	228	<1	228	6.06	5.92	37	1.18	22	348	105	67	15	3	29
		16/03/2021	0089_MW120_210316	EP2102833	<1	236	<1	236	6.22	6.67	38	3.48	21	464	1,410	78	17	3	30
		8/06/2021	0089_MW120_210608	EP2106448	<1	235	<1	235	6.26	6.73	40	3.61	21	360	40	80	17	3	29
		30/08/2021	0089_MW120_210830	EP2110020	<1	240	<1	240	6.57	6.88	46	2.30	23			78	19	3	31
		23/02/2016	DS3_MB03A	EP1601568															
		25/10/2016	DS3_MB03A	521581															
		8/03/2017	0089_MW121_S_170803	199045		240					25	5.3				92	14	1.2	15
		20/09/2017	0089_MW121_D_170920	176250															
		20/09/2017	0089_MW121_S_170920	176250															
		18/10/2017	0089_MW121_D_171018	178113															
		18/10/2017	0089_MW121_S_171018	178113															
		16/11/2017	0089_MW121_D_171116	203411															
		16/11/2017	0089_MW121_S_171116	203411															
		6/12/2017	0089_MW121_D_171206	204243															
Fire Training Area	MW121	6/12/2017	0089_MW121_S_171206	204243															
		18/01/2018	0089_MW121_D_180118	205797															
		18/01/2018	0089_MW121_S_180118	205797															
		16/12/2019	0089_MW121_191216	EP1913380	<1	245	<1	245	5.57	5.53	15	0.37	12	344	622	76	12	2	16
		30/03/2020	0089_MW121_200330	EP2003333	<1	204	<1	204	5.60	6.93	40	10.6	19	400	2,160	87	14	5	30
		15/07/2020	0089_MW121_200715	EP2007385	<1	226	<1	226	6.55	6.98	50	3.20	30	450	144	91	15	3	26
		21/09/2020	0089_MW121_200921	EP2010093	<1	241	<1	241	6.56	6.90	44	2.54	24	373	72	86	17	3	26
		14/12/2020	0089_MW121_201214	EP2013992	<1	235	<1	235	6.37	7.29	44	6.71	21	325	62	95	16	4	26
		16/03/2021	0089_MW121_210316	EP2102833	<1	211	<1	211	5.74	6.75	40	8.06	19	544	7,700	84	15	4	28

Table 1 Groundwater Analytical Results

					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
		8/06/2021	**0089_MW121_210608**	**EP2106448**	<1	218	<1	218	6.40	7.10	54	5.16	25	476	59	89	16	3	29
		30/08/2021	**0089_MW121_210830**	**EP2110020**	<1	229	<1	229	6.03	5.80	39	1.95	17			69	11	4	31
		8/03/2017	**0089_MW123_S_170803**	**199045**		240					33	1.4				73	15	2.2	25
		20/09/2017	**0089_MW123_D_170920**	**176250**															
		20/09/2017	**0089_MW123_S_170920**	**176250**															
		18/10/2017	**0089_MW123_D_171018**	**178113**															
		18/10/2017	**0089_MW123_S_171018**	**178113**															
		16/11/2017	**0089_MW123_D_171116**	**203411**															
		16/11/2017	**0089_MW123_S_171116**	**203411**															
Fire Training Area	**MW123**	**6/12/2017**	**0089_MW123_D_171206**	**204243**															
		6/12/2017	**0089_MW123_S_171206**	**204243**															
		18/01/2018	**0089_MW123_D_180118**	**205797**															
		18/01/2018	**0089_MW123_S_180118**	**205797**															
		16/12/2019	**0089_MW123_191216**	**EP1913380**	<1	354	<1	354	8.06	6.91	29	7.69	8	383	2,140	90	13	5	28
		14/12/2020	**0089_MW123_201214**	**EP2013992**	<1	231	<1	231	15.5	14.9	354	2.13	44	757	643	97	32	12	163
		16/03/2021	**0089_MW123_210316**	**EP2102833**	<1	191	<1	191	5.29	5.72	47	3.96	7	319	179	74	10	3	26
		8/06/2021	**0089_MW123_210608**	**EP2106448**	<1	334	<1	334	9.28	8.47	88	4.56	6	518	5,200	94	17	3	53
		30/08/2021	**0089_MW123_210830**	**EP2110020**	<1	261	<1	261	7.39	7.23	69	1.06	11			86	14	2	40
		8/03/2017	**0089_MW124_S_170803**	**199045**		420					14,000	0.84				440	990	260	8,000
		20/09/2017	**0089_MW124_D_170920**	**176250**															
		20/09/2017	**0089_MW124_S_170920**	**176250**															
		18/10/2017	**0089_MW124_D_171018**	**178113**															
		18/10/2017	**0089_MW124_S_171018**	**178113**															
		16/11/2017	**0089_MW124_D_171116**	**203411**															
		16/11/2017	**0089_MW124_S_171116**	**203411**															
		6/12/2017	**0089_MW124_D_171206**	**204243**															
Fire Training Area	**MW124**	**6/12/2017**	**0089_MW124_S_171206**	**204243**															
		18/01/2018	**0089_MW124_D_180118**	**205797**															
		18/01/2018	**0089_MW124_S_180118**	**205797**															
		9/01/2020	**0089_MW124_200109**	**EP2000249**	<1	328	<1	328	473	554	15,100	7.86	1,950	30,200	14	544	1,260	468	9,450
		30/03/2020	**0089_MW124_200330**	**EP2003333**	<1	308	<1	308	484	536	15,400	5.02	2,110	32,000	35	510	1,320	483	8,950
		15/07/2020	**0089_MW124_200715**	**EP2007382**	<1	206	<1	206	574	652	18,300	6.34	2,580	40,800	<5	501	1,410	581	11,400
		22/09/2020	**0089_MW124_200922**	**EP2010151**	<1	419	<1	419	522	546	16,600	2.20	2,190	33,700	555	502	1,250	487	9,320
		14/12/2020	**0089_MW124_201214**	**EP2013984**	<1	359	<1	359	504	544	16,000	3.85	2,170	28,100	269	516	1,280	498	9,200
		15/03/2021	**0089_MW124_210315**	**EP2102752**	<1	324	<1	324	497	531	15,800	3.31	2,160	33,200	36	482	1,210	459	9,100
		8/06/2021	**0089_MW124_210608**	**EP2106448**	<1	360	<1	360	462	482	14,700	2.14	1,920	33,000	92	447	1,110	459	8,200
		30/08/2021	**0089_MW124_210830**	**EP2110019**	<1	390	<1	390	432	490	13,800	6.27	1,700			440	1,120	405	8,410
		8/03/2017	**0089_MW125_S_170803**	**199045**		420					15,000	-0.59				410	1,000	270	8,200
		20/09/2017	**0089_MW125_D_170920**	**176250**															
		20/09/2017	**0089_MW125_S_170920**	**176250**															
		18/10/2017	**0089_MW125_D_171018**	**178113**															
		18/10/2017	**0089_MW125_S_171018**	**178113**															
		16/11/2017	**0089_MW125_D_171116**	**203411**															
		16/11/2017	**0089_MW125_S_171116**	**203411**															
		6/12/2017	**0089_MW125_D_171206**	**204243**															
Fire Training Area	**MW125**	**6/12/2017**	**0089_MW125_S_171206**	**204243**															
		18/01/2018	**0089_MW125_D_180118**	**205797**															
		18/01/2018	**0089_MW125_S_180118**	**205797**															
		9/01/2020	**0089_MW125_200109**	**EP2000249**	<1	310	<1	310	487	585	15,500	9.16	2,100	31,900	96	552	1,360	498	9,960
		30/03/2020	**0089_MW125_200330**	**EP2003333**	<1	504	<1	504	511	609	16,100	8.68	2,270	33,700	74	591	1,530	549	10,100
		15/07/2020	**0089_MW125_200715**	**EP2007382**	<1	288	<1	288	568	667	18,100	8.03	2,480	40,600	31	560	1,450	596	11,600
		22/09/2020	**0089_MW125_200922**	**EP2010151**	<1	329	<1	329	525	551	16,700	2.40	2,270	33,700	40	492	1,280	504	9,380
		14/12/2020	**0089_MW125_201214**	**EP2013984**	<1	342	<1	342	507	578	16,100	6.60	2,200	29,700	236	536	1,380	531	9,760
		15/03/2021	**0089_MW125_210315**	**EP2102752**	<1	448	<1	448	533	586	16,900	4.68	2,290	35,000	145	542	1,350	508	9,990
		8/06/2021	**0089_MW125_210608**	**EP2106448**	<1	407	<1	407	484	516	15,400	3.27	1,980	34,900	26	471	1,200	499	8,770
		30/08/2021	**0089_MW125_210830**	**EP2110019**	<1	441	<1	441	477	554	15,200	7.51	1,890			476	1,300	459	9,470
		8/03/2017	**0089_MW126_S_170803**	**199045**		610					15,000	-0.87				400	1,000	250	7,900
		20/09/2017	**0089_MW126_D_170920**	**176250**															
		20/09/2017	**0089_MW126_S_170920**	**176250**															
		18/10/2017	**0089_MW126_D_171018**	**178113**															
		18/10/2017	**0089_MW126_S_171018**	**178113**															
		16/11/2017	**0089_MW126_D_171116**	**203411**															
		16/11/2017	**0089_MW126_S_171116**	**203411**															
		6/12/2017	**0089_MW126_D_171206**	**204243**															
Fire Training Area	**MW126**	**6/12/2017**	**0089_MW126_S_171206**	**204243**															
		18/01/2018	**0089_MW126_D_180118**	**205797**															
		18/01/2018	**0089_MW126_S_180118**	**205797**															
		8/01/2020	**0089_MW126_200108**	**EP2000179**	<1	502	<1	502	499	520	16,000	2.05	1,800	34,900	51	469	1,240	467	8,790
		31/03/2020	**0089_MW126_200331**	**EP2003364**	<1	478	<1	478	462	536	14,600	7.46	1,950	29,600	38	547	1,360	464	8,860
		15/07/2020	**0089_MW126_200715**	**EP2007382**	<1	346	<1	346	524	579	16,700	5.07	2,190	37,000	<5	539	1,280	480	10,000
		22/09/2020	**0089_MW126_200922**	**EP2010151**	<1	443	<1	443	495	552	15,800	5.40	1,960	32,300	62	511	1,310	482	9,340
		14/12/2020	**0089_MW126_201214**	**EP2013984**	<1	485	<1	485	472	522	15,000	5.08	1,860	26,500	156	505	1,290	461	8,710
		15/03/2021	**0089_MW126_210315**	**EP2102752**	<1	400	<1	400	499	541	15,900	4.00	2,040	33,000	684	506	1,280	453	9,160
		8/06/2021	**0089_MW126_210608**	**EP2106448**	<1	444	<1	444	448	485	14,200	3.95	1,870	24,500	64	451	1,160	448	8,180
		30/08/2021	**0089_MW126_210830**	**EP2110019**	<1	594	<1	594	448	506	14,300	5.99	1,600			454	1,220	403	8,560
		8/03/2017	**0089_MW127_S_170803**	**199045**		630					13,000	-0.38				320	910	220	6,800
		20/09/2017	**0089_MW127_D_170920**	**176250**															
		20/09/2017	**0089_MW127_S_170920**	**176250**															
		18/10/2017	**0089_MW127_D_171018**	**178113**															
		18/10/2017	**0089_MW127_S_171018**	**178113**															
		16/11/2017	**0089_MW127_D_171116**	**203411**															
		16/11/2017	**0089_MW127_S_171116**	**203411**															
		6/12/2017	**0089_MW127_D_171206**	**204243**															
Fire Training Area	**MW127**	**6/12/2017**	**0089_MW127_S_171206**	**204243**															
		18/01/2018	**0089_MW127_D_180118**	**205797**															
		18/01/2018	**0089_MW127_S_180118**	**205797**															
		8/01/2020	**0089_MW127_200108**	**EP2000179**	<1	483	<1	483	438	459	14,000	2.40	1,600	29,600	761	394	1,120	408	7,750
		31/03/2020	**0089_MW127_200331**	**EP2003364**	<1	471	<1	471	445	520	14,100	7.74	1,840	27,500	86	457	1,360	461	8,590
		15/07/2020	**0089_MW127_200715**	**EP2007382**	<1	510	<1	510	447	461	14,200	1.61	1,730	31,300	57	411	1,110	368	7,820
		22/09/2020	**0089_MW127_200922**	**EP2010151**	<1	488	<1	488	470	517	15,000	4.72	1,790	30,100	121	433	1,270	440	8,720
		14/12/2020	**0089_MW127_201214**	**EP2013984**	<1	470	<1	470	465	528	14,800	6.26	1,850	25,500	124	467	1,320	470	8,820
		15/03/2021	**0089_MW127_210315**	**EP2102752**	<1	438	<1	438	460	508	14,600	4.88	1,920	31,000	188	432	1,230	431	8,600
		8/06/2021	**0089_MW127_210608**	**EP2106448**	<1	478	<1	478	447	471	14,200	2.63	1,770	31,900	130	398	1,150	440	7,940
		30/08/2021	**0089_MW127_210830**	**EP2110019**	<1	559	<1	559	429	489	13,600	6.50	1,640			408	1,190	398	8,280
		8/03/2017	**0089_MW128_S_170803**	**199045**		310					28	3.6				100	18	4.9	32
		20/09/2017	**0089_MW128_D_170920**	**176250**															
		20/09/2017	**0089_MW128_S_170920**	**176250**															
		18/10/2017	**0089_MW128_D_171018**	**178113**															
		18/10/2017	**0089_MW128_S_171018**	**178113**															
Fire Training Area	**MW128**	**16/11/2017**	**0089_MW128_D_171116**	**203411**															
		16/11/2017	**0089_MW128_S_171116**	**203411**															
		6/12/2017	**0089_MW128_D_171206**	**204243**															
		6/12/2017	**0089_MW128_S_171206**	**204243**															
		18/01/2018	**0089_MW128_D_180118**	**205797**															
		18/01/2018	**0089_MW128_S_180118**	**205797**															
		1/08/2017	**0089_MW137_S_170801**	**198918**		270					17,000	2.4				420	1,100	310	9,800
		19/09/2017	**0089_MW137_D_170919**	**176140**															
		19/09/2017	**0089_MW137_S_170919**	**176140**															
		17/10/2017	**0089_MW137_D_171017**	**177985**															
		17/10/2017	**0089_MW137_S_171017**	**177985**															
		20/11/2017	**0089_MW137_D_171120**	**203545**															
		20/11/2017	**0089_MW137_S_171120**	**203545**															
		4/12/2017	**0089_MW137_D_171204**	**204124**															
		4/12/2017	**0089_MW137_S_171204**	**204124**															

					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
Demolition Ground	**MW137**	**17/01/2018**	**0089_MW137_D_1801117**	**205691**															
		17/01/2018	**0089_MW137_S_1801117**	**205691**															
		1/02/2018	**0089_MW137_D_180201**	**206292**		390					9,800	-1.0				230	630	210	5,600
		1/02/2018	**0089_MW137_I_180201**	**206292**		400					9,800	-1.7				230	620	210	5,400
		1/02/2018	**0089_MW137_S_180201**	**206292**		400					9,400	-1.9				220	590	200	5,200
		8/01/2020	**0089_MW137_200108**	**EP2000179**	<1	349	<1	349	400	407	12,600	0.79	1,820	23,300	281	311	904	413	7,040
		30/03/2020	**0089_MW137_200330**	**EP2003308**	<1	250	<1	250	468	522	14,800	5.46	2,200	29,800	58	427	1,240	518	8,870
		20/07/2020	**0089_MW137_200720**	**EP2007544**	<1	126	<1	126	566	666	18,000	8.15	2,680	40,800	373	464	1,450	592	11,700
		23/09/2020	**0089_MW137_200923**	**EP2010220**	<1	129	<1	129	690	723	22,000	2.35	3,210	38,000	410	510	1,650	716	12,500
		14/12/2020	**0089_MW137_201214**	**EP2013975**	<1	444	<1	444	589	673	18,500	6.66	2,800	37,200	112	597	1,530	672	11,500
		16/03/2021	**0089_MW137_210316**	**EP2102837**	<1	251	<1	251	582	699	18,400	9.13	2,800	39,100	522	566	1,550	676	12,100
		8/06/2021	**0089_MW137_210608**	**EP2106464**	<1	183	<1	183	541	591	17,300	4.44	2,370	39,200	197	443	1,320	492	10,300
Demolition Ground	**MW139**	**30/10/2010**	**C24-MB01**	**EP1005976**															
		18/10/2013	**WA0006_C24_MB01**	**EP1307981**															
		26/05/2015	**C24_MB01**	**EP1510572**															
		29/09/2015	**C24_MB01**	**EP1514335**															
		25/10/2016	**C24_MB01**	**521581**															
		1/08/2017	**0089_MW139_S_170801**	**198918**		200					37	6.3				81	12	2.0	27
		19/09/2017	**0089_MW139_D_170919**	**176140**															
		19/09/2017	**0089_MW139_S_170919**	**176140**															
		17/10/2017	**0089_MW139_D_171017**	**177985**															
		17/10/2017	**0089_MW139_S_171017**	**177985**															
		20/11/2017	**0089_MW139_D_171120**	**203545**															
		20/11/2017	**0089_MW139_S_171120**	**203545**															
		4/12/2017	**0089_MW139_D_171204**	**204124**															
		4/12/2017	**0089_MW139_S_171204**	**204124**															
		17/01/2018	**0089_MW139_D_1801117**	**205691**															
		17/01/2018	**0089_MW139_S_1801117**	**205691**															
		1/02/2018	**0089_MW139_D_180201**	**206292**		160					27	9.0				72	8.4	1.4	18
		1/02/2018	**0089_MW139_I_180201**	**206292**		160					25	9.0				71	8.4	1.4	17
		1/02/2018	**0089_MW139_S_180201**	**206292**		160					27	8.7				69	8.8	1.5	19
		8/01/2020	**0089_MW139_200108**	**EP2000179**	<1	207	<1	207	46.3	49.5	1,400	3.26	130	3,060	26	152	104	39	743
		30/03/2020	**0089_MW139_200330**	**EP2003308**	<1	262	<1	262	102	107	3,200	2.68	300	6,650	161	204	249	90	1,710
		20/07/2020	**0089_MW139_200720**	**EP2007544**	<1	302	<1	302	142	155	4,440	4.23	521	9,650	74	206	376	116	2,540
		22/09/2020	**0089_MW139_200922**	**EP2010151**	<1	198	<1	198	58.8	56.9	1,770	1.69	238	3,660	216	134	134	45	874
		14/12/2020	**0089_MW139_201214**	**EP2013983**	<1	258	<1	258	118	113	3,670	2.04	447	6,580	22	214	283	90	1,770
		16/03/2021	**0089_MW139_210316**	**EP2102837**	<1	272	<1	272	71.3	71.8	2,180	0.36	210	4,340	11	165	161	63	1,120
		8/06/2021	**0089_MW139_210608**	**EP2106464**	<1	155	<1	155	34.1	33.6	993	0.70	145	2,310	22	106	80	25	486
		31/08/2021	**0089_MW139_210831**	**EP2110071**	<1	149	<1	149	4.47	4.87	41	4.35	16			66	8	2	20
Demolition Ground	**MW141**	**30/10/2010**	**C24-MB03**	**EP1005976**															
		18/10/2013	**WA0006_C24_MB03**	**EP1307981**															
		26/05/2015	**C24_MB03**	**EP1510572**															
		29/09/2015	**C24_MB03**	**EP1514335**															
		25/10/2016	**C24_MB03**	**521581**															
		1/08/2017	**0089_MW141_S_170801**	**198918**		420					4,900	2.8				260	330	96	2,900
		19/09/2017	**0089_MW141_D_170919**	**176140**															
		19/09/2017	**0089_MW141_S_170919**	**176140**															
		17/10/2017	**0089_MW141_D_171017**	**177985**															
		17/10/2017	**0089_MW141_S_171017**	**177985**															
		20/11/2017	**0089_MW141_D_171120**	**203545**															
		20/11/2017	**0089_MW141_S_171120**	**203545**															
		4/12/2017	**0089_MW141_D_171204**	**204124**															
		4/12/2017	**0089_MW141_S_171204**	**204124**															
		17/01/2018	**0089_MW141_D_1801117**	**205691**															
		17/01/2018	**0089_MW141_S_1801117**	**205691**															
		1/02/2018	**0089_MW141_D_180201**	**206292**		400					6,700	3.7				270	470	130	4,000
		1/02/2018	**0089_MW141_I_180201**	**206292**		400					7,100	-0.72				270	460	130	3,800
		1/02/2018	**0089_MW141_S_180201**	**206292**		410					4,500	-0.93				240	300	86	2,400
		8/01/2020	**0089_MW141_200108**	**EP2000179**	<1	423	<1	423	230	230	7,220	0.13	866	14,300	103	334	521	184	3,800
		30/03/2020	**0089_MW141_200330**	**EP2003308**	<1	388	<1	388	336	337	10,700	0.08	1,290	21,000	83	426	797	306	5,570
		20/07/2020	**0089_MW141_200720**	**EP2007544**	<1	374	<1	374	340	385	10,700	6.14	1,500	23,500	36	374	858	309	6,620
		23/09/2020	**0089_MW141_200923**	**EP2010220**	<1	393	<1	393	310	306	9,800	0.65	1,220	16,400	74	382	700	282	5,100
		14/12/2020	**0089_MW141_201214**	**EP2013975**	<1	346	<1	346	304	315	9,590	1.78	1,260	18,700	961	396	732	280	5,230
		16/03/2021	**0089_MW141_210316**	**EP2102837**	<1	340	<1	340	362	404	11,400	5.42	1,630	23,800	541	432	907	363	6,860
		8/06/2021	**0089_MW141_210608**	**EP2106464**	<1	400	<1	400	346	350	11,000	0.62	1,320	23,000	94	396	784	323	5,920
		31/08/2021	**0089_MW141_210831**	**EP2110071**	<1	466	<1	466	257	263	8,060	1.06	994			368	577	203	4,410
Demolition Ground	**MW142**	**1/08/2017**	**0089_MW142_S_170801**	**198918**		330					4,000	1.6				140	290	85	2,400
		19/09/2017	**0089_MW142_D_170919**	**176140**															
		19/09/2017	**0089_MW142_S_170919**	**176140**															
		17/10/2017	**0089_MW142_D_171017**	**177985**															
		17/10/2017	**0089_MW142_S_171017**	**177985**															
		20/11/2017	**0089_MW142_D_171120**	**203545**															
		20/11/2017	**0089_MW142_S_171120**	**203545**															
		4/12/2017	**0089_MW142_D_171204**	**204124**															
		4/12/2017	**0089_MW142_S_171204**	**204124**															
		17/01/2018	**0089_MW142_D_1801117**	**205691**															
		17/01/2018	**0089_MW142_S_1801117**	**205691**															
		1/02/2018	**0089_MW142_D_180201**	**206292**		280					10,000	0.83				270	700	210	5,800
		1/02/2018	**0089_MW142_I_180201**	**206292**		300					8,700	-1.2				230	580	160	4,800
		1/02/2018	**0089_MW142_S_180201**	**206292**		340					4,000	-0.91				150	280	80	2,200
		8/01/2020	**0089_MW142_200108**	**EP2000179**	<1	481	<1	481	236	268	7,420	6.36	822	14,500	145	350	636	185	4,450
		30/03/2020	**0089_MW142_200330**	**EP2003308**	<1	609	<1	609	306	326	9,670	3.28	993	18,400	135	475	797	272	5,290
		20/07/2020	**0089_MW142_200720**	**EP2007544**	<1	362	<1	362	422	488	13,300	7.24	1,890	30,600	98	454	1,080	469	8,370
		23/09/2020	**0089_MW142_200923**	**EP2010220**	<1	359	<1	359	533	542	17,000	0.82	2,220	32,400	208	495	1,240	511	9,240
		14/12/2020	**0089_MW142_201214**	**EP2013975**	<1	331	<1	331	376	406	11,900	3.83	1,640	22,900	352	412	948	369	6,860
		16/03/2021	**0089_MW142_210316**	**EP2102837**	<1	303	<1	303	400	468	12,600	7.84	1,870	27,100	155	445	1,070	420	7,990
		8/06/2021	**0089_MW142_210608**	**EP2106464**	<1	324	<1	324	400	415	12,800	1.86	1,550	27,000	124	401	941	392	7,070
		30/08/2021	**0089_MW142_210830**	**EP2110016**	<1	358	<1	358	223	243	7,010	4.38	870			291	554	196	4,100
Demolition Ground	**MW147**	**30/10/2010**	**C24-MB02**	**EP1005976**															
		18/10/2013	**WA0006_C24_MB02**	**EP1307981**															
		26/05/2015	**C24_MB02**	**EP1510572**															
		29/09/2015	**C24_MB02**	**EP1514335**															
		25/10/2016	**C24_MB02**	**521581**															
		1/08/2017	**0089_MW147_S_170801**	**198918**		440					4,800	4.5				270	330	96	2,900
		19/09/2017	**0089_MW147_D_170919**	**176140**															
		19/09/2017	**0089_MW147_S_170919**	**176140**															
		17/10/2017	**0089_MW147_D_171017**	**177985**															
		17/10/2017	**0089_MW147_S_171017**	**177985**															
		20/11/2017	**0089_MW147_D_171120**	**203545**															
		20/11/2017	**0089_MW147_S_171120**	**203545**															
		4/12/2017	**0089_MW147_D_171204**	**204124**															
		4/12/2017	**0089_MW147_S_171204**	**204124**															
		17/01/2018	**0089_MW147_D_1801117**	**205691**															
		17/01/2018	**0089_MW147_S_1801117**	**205691**															
		1/02/2018	**0089_MW147_D_180201**	**206292**		400					8,200	0.15				270	540	140	4,600
		1/02/2018	**0089_MW147_I_180201**	**206292**		400					7,900	-0.43				260	530	140	4,300
		1/02/2018	**0089_MW147_S_180201**	**206292**		440					4,100	-0.33				200	290	75	2,200
		20/07/2020	**0089_MW147_200720**	**EP2007544**	<1	573	<1	573	239	262	7,420	4.60	874	15,700	691	337	575	202	4,430
		1/08/2017	**0089_MW149_S_170801**	**198918**		270					15,000	1.1				420	970	270	8,300
		19/09/2017	**0089_MW149_D_170919**	**176140**															
		19/09/2017	**0089_MW149_S_170919**	**176140**															
		17/10/2017	**0089_MW149_D_171017**	**177985**															
		17/10/2017	**0089_MW149_S_171017**	**177985**															
		20/11/2017	**0089_MW149_D_171120**	**203545**															

Table 1 Groundwater Analytical Results

					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
Demolition Ground	**MW149**	**20/11/2017**	**0089_MW149_S_171120**	**203545**															
		4/12/2017	**0089_MW149_D_171204**	**204124**															
		4/12/2017	**0089_MW149_S_171204**	**204124**															
		17/01/2018	**0089_MW149_D_1801117**	**205691**															
		17/01/2018	**0089_MW149_S_1801117**	**205691**															
		1/02/2018	**0089_MW149_D_180201**	**206292**		220					15,000	0.49				330	960	290	8,500
		1/02/2018	**0089_MW149_I_180201**	**206292**		260					12,000	-0.79				290	790	250	6,800
		1/02/2018	**0089_MW149_S_180201**	**206292**		360					7,400	2.3				210	510	150	4,500
		8/01/2020	**0089_MW149_200108**	**EP2000179**	<1	393	<1	393	257	263	7,890	1.07	1,300	15,900	393	239	593	240	4,510
		30/03/2020	**0089_MW149_200330**	**EP2003308**	<1	434	<1	434	320	341	10,000	3.24	1,400	19,600	152	335	821	323	5,720
		20/07/2020	**0089_MW149_200720**	**EP2007544**	<1	203	<1	203	567	678	18,000	8.89	2,650	40,800	360	476	1,470	596	11,900
		23/09/2020	**0089_MW149_200923**	**EP2010217**	<1	131	<1	131	595	637	18,900	3.39	2,840	35,700	84	463	1,450	616	11,000
		14/12/2020	**0089_MW149_201214**	**EP2013983**	<1	136	<1	136	601	678	19,100	5.99	2,860	34,000	118	497	1,540	670	11,700
		16/03/2021	**0089_MW149_210316**	**EP2102836**	<1	232	<1	232	610	659	19,400	3.85	2,810	39,600	347	498	1,480	653	11,400
		8/06/2021	**0089_MW149_210608**	**EP2106464**	<1	350	<1	350	444	478	14,000	3.71	2,020	31,800	431	386	1,080	504	8,210
		30/08/2021	**0089_MW149_210830**	**EP2110016**	<1	133	<1	133	518	565	16,500	4.34	2,380			404	1,270	518	9,810
Waste Water Treatment Plant	**MW158**	**7/08/2017**	**0089_MW158_S_170807**	**199149**		450					4,600	1.1				210	330	84	2,600
		8/01/2020	**0089_MW158_200108**	**EP2000182**	<1	420	<1	420	144	154	4,480	3.27	465	9,670	26	241	389	124	2,460
		31/03/2020	**0089_MW158_200331**	**EP2003364**	<1	495	<1	495	147	151	4,520	1.32	462	8,670	13	222	374	116	2,440
		21/07/2020	**0089_MW158_200721**	**EP2007594**	<1	455	<1	455	135	129	4,120	2.47	483	9,370	23	203	327	103	2,050
		21/09/2020	**0089_MW158_200921**	**EP2010093**	<1	575	<1	575	145	141	4,390	1.42	482	8,800	195	197	342	111	2,310
		14/12/2020	**0089_MW158_201214**	**EP2013984**	<1	440	<1	440	154	138	4,750	5.38	526	8,360	52	191	338	110	2,250
		15/03/2021	**0089_MW158_210315**	**EP2102752**	<1	405	<1	405	143	146	4,390	0.95	524	9,480	6	202	343	112	2,400
		10/06/2021	**0089_MW158_210610**	**EP2106588**	<1	418	<1	418	152	144	4,700	2.41	508	9,280	5	204	348	113	2,360
		30/08/2021	**0089_MW158_210830**	**EP2110020**	<1	448	<1	448	124	151	3,720	9.81	486			206	354	111	2,500
Waste Water Treatment Plant	**MW161**	**7/08/2017**	**0089_MW161_S_170807**	**199149**		390					1,100	0.39				150	86	41	610
		18/09/2017	**0089_MW161_S_170918**	**176030**															
		19/10/2017	**0089_MW161_S_171019**	**178275**															
		15/11/2017	**0089_MW161_S_171115**	**203378**															
		7/12/2017	**0089_MW161_S_171207**	**204323**															
		16/01/2018	**0089_MW161_S_180116**	**205631**															
		8/01/2020	**0089_MW161_200108**	**EP2000182**	<1	311	<1	311	30.4	32.2	672	2.94	249	2,120	302	125	87	36	411
		1/04/2020	**0089_MW161_200401**	**EP2003417**	<1	318	<1	318	33.1	34.3	777	1.75	233	2,080	420	132	96	40	432
		21/07/2020	**0089_MW161_200721**	**EP2007594**	<1	400	<1	400	30.3	29.9	673	0.63	158	1,910	69	86	98	34	383
		21/09/2020	**0089_MW161_200921**	**EP2010093**	<1	353	<1	353	32.1	34.4	721	3.44	226	2,000	227	126	96	38	442
		14/12/2020	**0089_MW161_201214**	**EP2013992**	<1	327	<1	327	32.9	30.6	774	3.53	217	1,840	773	119	76	36	403
		15/03/2021	**0089_MW161_210315**	**EP2102752**	<1	337	<1	337	32.6	30.5	779	3.30	188	1,990	642	78	81	38	437
		10/06/2021	**0089_MW161_210610**	**EP2106588**	<1	324	<1	324	32.1	33.8	792	2.69	156	2,090	686	139	79	39	446
		30/08/2021	**0089_MW161_210830**	**EP2110020**	<1	393	<1	393	32.5	32.6	762	0.18	152			122	89	37	420
Waste Water Treatment Plant	**MW166**	**7/08/2017**	**0089_MW166_S_170807**	**199149**		430					1,000	2.5				150	100	37	590
		18/09/2017	**0089_MW166_S_170918**	**176030**															
		19/10/2017	**0089_MW166_S_171019**	**178275**															
		15/11/2017	**0089_MW166_S_171115**	**203378**															
		7/12/2017	**0089_MW166_S_171207**	**204323**															
		16/01/2018	**0089_MW166_S_180116**	**205631**															
		8/01/2020	**0089_MW166_200108**	**EP2000182**	<1	539	<1	539	40.5	44.2	946	4.34	145	3,040	764	172	114	51	572
		1/04/2020	**0089_MW166_200401**	**EP2003417**	<1	542	<1	542	45.0	48.4	1,080	3.62	179	2,910	193	194	124	59	621
		21/07/2020	**0089_MW166_200721**	**EP2007594**	<1	590	<1	590	43.3	43.1	1,000	0.24	158	2,810	64	158	112	48	569
		22/09/2020	**0089_MW166_200922**	**EP2010151**	<1	518	<1	518	40.2	37.9	958	2.99	137	2,250	196	145	96	46	496
		14/12/2020	**0089_MW166_201214**	**EP2013984**	<1	394	<1	394	36.9	34.4	899	3.50	176	2,070	74	120	92	41	455
		10/06/2021	**0089_MW166_210610**	**EP2106588**	<1	515	<1	515	47.1	50.5	1,150	3.45	212	2,990	66	153	142	53	686
		30/08/2021	**0089_MW166_210830**	**EP2110019**	<1	363	<1	363	36.1	37.0	908	1.18	156			132	96	41	493
Waste Water Treatment Plant	**MW171**	**7/08/2017**	**0089_MW171_S_170807**	**199149**		680					2,400	1.6				140	210	56	1,400
		18/09/2017	**0089_MW171_S_170918**	**176030**															
		19/10/2017	**0089_MW171_S_171019**	**178275**															
		15/11/2017	**0089_MW171_S_171115**	**203378**															
		7/12/2017	**0089_MW171_S_171207**	**204323**															
		16/01/2018	**0089_MW171_S_180116**	**205631**															
		1/04/2020	**0089_MW171_200401**	**EP2003417**	<1	450	<1	450	160	147	4,920	4.00	575	9,160	96	220	387	111	2,340
		21/07/2020	**0089_MW171_200721**	**EP2007594**	<1	304	<1	304	60.8	64.4	1,800	2.88	190	4,320	153	116	157	52	1,020
		14/12/2020	**0089_MW171_201214**	**EP2013992**	<1	326	<1	326	57.4	57.1	1,670	0.26	180	3,510	21	113	138	48	893
		15/03/2021	**0089_MW171_210315**	**EP2102752**	<1	358	<1	358	99.0	98.1	3,000	0.49	349	6,280	29	147	237	81	1,590
		10/06/2021	**0089_MW171_210610**	**EP2106588**	<1	429	<1	429	149	172	4,520	7.32	606	10,200	13	219	427	118	2,830
		30/08/2021	**0089_MW171_210830**	**EP2110019**	<1	452	<1	452	138	155	4,200	5.51	528			195	381	104	2,550
Waste Water Treatment Plant	**MW172**	**7/08/2017**	**0089_MW172_S_170807**	**199149**		480					5,000	2.2				230	380	94	2,900
Waste Water Treatment Plant	**MW173**	**9/08/2017**	**0089_MW173_S_170809**	**199252**		490					2,500	5.8				230	190	46	1,500
		18/09/2017	**0089_MW173_S_170918**	**176030**															
		19/10/2017	**0089_MW173_S_171019**	**178275**															
		15/11/2017	**0089_MW173_S_171115**	**203378**															
		7/12/2017	**0089_MW173_S_171207**	**204323**															
		16/01/2018	**0089_MW173_S_180116**	**205631**															
		16/01/2020	**0089_MW173_200117**	**EP2000515**	<1	456	<1	456	73.1	71.1	2,130	1.35	187	4,740	119	196	171	63	1,050
		31/03/2020	**0089_MW173_200331**	**EP2003364**	<1	577	<1	577	70.9	72.9	1,930	1.33	239	4,150	46	176	178	79	1,090
		22/07/2020	**0089_MW173_200722**	**EP2007667**	<1	1,030	<1	1,030	65.5	67.9	1,380	1.83	286	3,880	118	162	178	79	992
		16/03/2021	**0089_MW173_210316**	**EP2102833**	<1	583	<1	583	40.4	38.4	824	2.49	264	2,210	98	83	104	45	565
		10/06/2021	**0089_MW173_210610**	**EP2106579**	<1	668	<1	668	40.3	39.5	813	1.02	194	2,210	61	82	126	54	544
Waste Water Treatment Plant	**MW193**	**8/08/2017**	**0089_MW193_S_170808**	**199212**		470					1,100	-1.9				140	87	25	600
		18/09/2017	**0089_MW193_S_170918**	**176030**															
		19/10/2017	**0089_MW193_S_171019**	**178275**															
		15/11/2017	**0089_MW193_S_171115**	**203378**															
		7/12/2017	**0089_MW193_S_171207**	**204323**															
		16/01/2018	**0089_MW193_S_180116**	**205631**															
		8/01/2020	**0089_MW193_200108**	**EP2000186**	<1	546	<1	546	39.4	38.3	813	1.35	266	2,440	745	171	105	28	470
		31/03/2020	**0089_MW193_200331**	**EP2003374**	<1	686	<1	686	45.8	43.7	1,030	2.37	146	2,650	2,110	133	128	38	587
		15/07/2020	**0089_MW193_200715**	**EP2007385**	<1	669	<1	669	33.8	32.8	676	1.44	64	1,830	828	146	100	30	380
		16/12/2020	**0089_MW193_201216**	**EP2014087**	<1	484	<1	484	33.7	33.4	692	0.47	218	2,000	274	158	95	31	389
		16/03/2021	**0089_MW193_210316**	**EP2102833**	<1	629	<1	629	38.9	37.5	852	1.81	111	2,120	68	116	118	33	487
		10/06/2021	**0089_MW193_210610**	**EP2106580**	<1	492	<1	492	35.9	37.1	843	1.58	111	2,180	2,160	123	111	36	480
		30/08/2021	**0089_MW193_210830**	**EP2110020**	<1	424	<1	424	30.0	28.0	679	3.50	115			119	73	27	353
Waste Water Treatment Plant	**MW195D**	**8/08/2017**	**0089_MW195_D_170808**	**199212**		370					10,000	0.39				350	700	190	5,900
		8/01/2020	**0089_MW195-D_200108**	**EP2000186**	<1	253	<1	253	195	192	6,080	0.95	906	11,900	41	258	459	159	3,150
		31/03/2020	**0089_MW195_D_200331**	**EP2003364**	<1	158	<1	158	342	369	10,800	3.71	1,660	20,900	150	434	917	315	6,060
		15/07/2020	**0089_MW195_D_200715**	**EP2007385**	<1	157	<1	157	404	438	12,900	4.05	1,770	26,700	64	465	967	368	7,490
		21/09/2020	**0089_MW195-D_200921**	**EP2010093**	<1	162	<1	162	380	390	12,000	1.32	1,840	24,600	650	421	923	344	6,540
		16/12/2020	**0089_MW195D_201216**	**EP2014087**	<1	193	<1	193	363	396	11,500	4.43	1,660	24,200	1,090	448	949	349	6,600
		16/03/2021	**0089_MW195D_210316**	**EP2102833**	<1	146	<1	146	418	436	13,500	2.11	1,670	26,400	448	461	1,000	383	7,390
		9/06/2021	**0089_MW195D_210609**	**EP2106514**	<1	224	<1	224	281	305	8,930	4.08	1,180	18,400	187	365	719	253	5,080
		30/08/2021	**0089_MW195D_210830**	**EP2110020**	<1	170	<1	170	312	341	9,860	4.44	1,480			365	785	297	5,770
Waste Water Treatment Plant	**MW195S**	**8/08/2017**	**0089_MW195_S_170808**	**199212**		420					360	0.68				140	51	11	210
		18/09/2017	**0089_MW195_S_170918**	**176030**															
		19/10/2017	**0089_MW195_S_171019**	**178275**															
		15/11/2017	**0089_MW195_S_171115**	**203378**															
		7/12/2017	**0089_MW195_S_171207**	**204323**															
		16/01/2018	**0089_MW195_S_180116**	**205631**															
		8/01/2020	**0089_MW195-S_200108**	**EP2000186**	<1	559	<1	559	48.8	48.0	1,110	0.80	304	2,980	429	144	142	50	641
		31/03/2020	**0089_MW195_S_200331**	**EP2003364**	<1	550	<1	550	47.6	47.8	1,090	0.13	283	2,880	1,200	163	144	50	609
		15/07/2020	**0089_MW195_S_200715**	**EP2007385**	<1	603	<1	603	53.8	57.6	1,250	3.40	310	3,350	12	194	159	54	768
		21/09/2020	**0089_MW195-S_200921**	**EP2010093**	<1	596	<1	596	52.0	55.9	1,150	3.62	369	3,240	992	178	167	56	733
		16/12/2020	**0089_MW195S_201216**	**EP2014087**	<1	575	<1	575	51.0	51.8	1,140	0.74	356	3,060	49	181	157	54	655
		16/03/2021	**0089_MW195S_210316**	**EP2102833**	<1	557	<1	557	50.7	51.7	1,160	0.96	328	3,060	199	186	155	53	650
		9/06/2021	**0089_MW195S_210609**	**EP2106514**	<1	570	<1	570	51.5	53.9	1,170	2.26	343	3,180	45	197	160	54	679
		30/08/2021	**0089_MW195S_210830**	**EP2110020**	<1	582	<1	582	56.6	58.6	1,340	1.73	344			203	167	56	765
		8/08/2017	**0089_MW196_S_170808**	**199212**		240					37	5.5				84	21	1.9	24
		2/04/2020	**0089_MW196_200402**	**EP2003472**	<1	218	<1	218	5.91	7.21	36	9.92	26	390	1,820	84	21	3	28

Table 1 Groundwater Analytical Results

					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
Waste Water Treatment Plant	**MW196**	**22/07/2020**	**0089_MW196_200722**	**EP2007667**	<1	223	<1	223	6.44	7.26	51	6.06	26	406	23	73	23	3	38
		24/09/2020	**0089_MW196_200924**	**EP2010271**	<1	221	<1	221	5.94	6.29	35	2.83	26	386	362	68	20	3	27
		16/12/2020	**0089_MW196_201216**	**EP2014087**	<1	261	<1	261	6.67	6.95	33	2.10	25	410	238	81	21	2	26
		10/06/2021	**0089_MW196_210610**	**EP2106579**	<1	210	<1	210	5.54	6.53	32	8.27	21	396	1,200	72	20	3	28
		30/08/2021	**0089_MW196_210830**	**EP2110019**	<1	219	<1	219	5.78	6.38	32	4.98	24			73	20	2	24
Waste Water Treatment Plant	**MW197**	**9/08/2017**	**0089_MW197_S_170809**	**199252**		660					2,400	4.1				100	220	54	1,600
		18/09/2017	**0089_MW197_S_170918**	**176030**															
		19/10/2017	**0089_MW197_S_171019**	**178275**															
		15/11/2017	**0089_MW197_S_171115**	**203378**															
		7/12/2017	**0089_MW197_S_171207**	**204323**															
		16/01/2018	**0089_MW197_S_180116**	**205631**															
		31/03/2020	**0089_MW197_200331**	**EP2003374**	<1	416	<1	416	42.9	44.7	1,140	2.12	116	2,630	337	84	126	44	668
		15/07/2020	**0089_MW197_200715**	**EP2007382**	<1	441	<1	441	47.9	46.7	1,290	1.26	129	2,900	140	74	126	43	725
		16/03/2021	**0089_MW197_210316**	**EP2102833**	<1	454	<1	454	62.5	65.1	1,760	2.01	182	3,810	821	90	184	59	1,010
		9/06/2021	**0089_MW197_210609**	**EP2106514**	<1	506	<1	506	56.8	58.3	1,540	1.28	158			80	170	55	895
		1/09/2021	**0089_MW197_210901**	**EP2110159**	<1	1,140	<1	1,140	72.7	70.6	1,490	1.44	378			67	324	91	880
Waste Water Treatment Plant	**MW199**	**8/08/2017**	**0089_MW199_S_170808**	**199212**		400					8,100	4.8				290	590	130	5,000
		18/09/2017	**0089_MW199_S_170918**	**176030**															
		19/10/2017	**0089_MW199_S_171019**	**178275**															
		15/11/2017	**0089_MW199_S_171115**	**203378**															
		7/12/2017	**0089_MW199_S_171207**	**204323**															
		16/01/2018	**0089_MW199_S_180116**	**205631**															
		8/01/2020	**0089_MW199_200108**	**EP2000186**	<1	366	<1	366	35.8	34.9	928	1.32	111	1,960	36	76	80	29	546
		31/03/2020	**0089_MW199_200331**	**EP2003364**	<1	863	<1	863	227	244	7,030	3.54	573	14,000	30	325	622	193	3,950
		15/07/2020	**0089_MW199_200715**	**EP2007385**	<1	506	<1	506	36.2	35.5	856	0.98	92	1,980	5	87	80	26	549
		21/09/2020	**0089_MW199_200921**	**EP2010093**	<1	797	<1	797	225	228	6,940	0.66	644	13,900	<5	288	542	217	3,760
		16/12/2020	**0089_MW199_201216**	**EP2014087**	<1	368	<1	368	34.0	35.4	865	2.01	107	2,080	154	97	102	29	492
		30/08/2021	**0089_MW199_210830**	**EP2110019**	<1	345	<1	345	14.4	13.6	221	2.77	59			70	46	10	139
Waste Water Treatment Plant	**MW200**	**9/08/2017**	**0089_MW200_S_170809**	**199252**		550					2,200	7.5				110	130	51	1,700
		18/09/2017	**0089_MW200_S_170918**	**176030**															
		19/10/2017	**0089_MW200_S_171019**	**178275**															
		15/11/2017	**0089_MW200_S_171115**	**203378**															
		7/12/2017	**0089_MW200_S_171207**	**204323**															
		16/01/2018	**0089_MW200_S_180116**	**205631**															
		9/01/2020	**0089_MW200_200109**	**EP2000249**	<1	445	<1	445	49.4	47.6	1,320	1.86	158	2,990	36	73	140	46	719
		31/03/2020	**0089_MW200_200331**	**EP2003374**	<1	430	<1	430	46.7	49.1	1,230	2.49	166	2,950	6	74	144	48	744
		15/07/2020	**0089_MW200_200715**	**EP2007382**	<1	534	<1	534	92.6	90.2	2,700	1.26	275	5,410	14	120	146	87	1,610
		24/09/2020	**0089_MW200_200924**	**EP2010273**	<1	437	<1	437	76.4	69.8	2,220	4.53	241	4,110	134	91	109	73	1,250
		15/12/2020	**0089_MW200_201215**	**EP2014051**	<1	405	<1	405	74.4	72.9	2,180	1.01	232	3,910	2,010	100	117	69	1,300
		16/03/2021	**0089_MW200_210316**	**EP2102833**	<1	421	<1	421	93.0	96.6	2,780	1.88	299	5,690	37	123	160	98	1,720
		9/06/2021	**0089_MW200_210609**	**EP2106514**	<1	451	<1	451	91.5	95.4	2,710	2.09	290	5,440	37	125	160	97	1,690
		1/09/2021	**0089_MW200_210901**	**EP2110159**	<1	462	<1	462	69.3	72.1	1,950	1.98	244			104	119	74	1,270
Waste Water Treatment Plant	**MW202**	**9/08/2017**	**0089_MW202_S_170809**	**199252**		400					280	3.4				100	35	12	240
		18/09/2017	**0089_MW202_S_170918**	**176030**															
		19/10/2017	**0089_MW202_S_171019**	**178275**															
		15/11/2017	**0089_MW202_S_171115**	**203378**															
		7/12/2017	**0089_MW202_S_171207**	**204323**															
		16/01/2018	**0089_MW202_S_180116**	**205631**															
		31/03/2020	**0089_MW202_200331**	**EP2003374**	1	371	<1	373	11.3	11.2	112	0.42	35	588	6	98	24	8	96
		22/07/2020	**0089_MW202_200722**	**EP2007667**	<1	364	<1	364	11.9	11.8	128	0.33	48	629	15	97	24	8	110
		21/09/2020	**0089_MW202_200921**	**EP2010077**	<1	367	<1	367	12.1	11.1	133	4.22	50	598	11	95	23	8	99
		16/12/2020	**0089_MW202_201216**	**EP2014087**	<1	349	<1	349	12.6	13.3	167	2.50	46	738	133	107	23	9	134
		15/03/2021	**0089_MW202_210315**	**EP2102755**	<1	319	<1	319	10.5	11.5	111	4.52	47	666	<5	100	24	8	99
		10/06/2021	**0089_MW202_210610**	**EP2106588**	<1	320	<1	320	11.3	11.6	137	1.12	52	664	<5	104	26	7	94
		30/08/2021	**0089_MW202_210830**	**EP2110019**	<1	356	<1	356	15.2	13.9	245	4.66	59			100	22	12	156
Waste Water Treatment Plant	**MW203**	**9/08/2017**	**0089_MW203_S_170809**	**199252**		390					170	5.5				94	59	12	180
		8/01/2020	**0089_MW203_200108**	**EP2000182**	<1	301	<1	301	10.7	12.1	71	6.42	127	674	791	74	56	10	82
		31/03/2020	**0089_MW203_200331**	**EP2003374**	<1	297	<1	297	9.93	11.6	65	7.67	104	609	90	75	56	9	69
		15/07/2020	**0089_MW203_200715**	**EP2007385**	<1	325	<1	325	10.0	11.2	54	5.16	98	580	274	76	51	8	68
		22/09/2020	**0089_MW203_200922**	**EP2010141**	<1	316	<1	316	9.10	10.1	48	5.29	69	543	55	77	44	7	57
		16/12/2020	**0089_MW203_201216**	**EP2014087**	<1	296	<1	296	8.52	9.91	46	7.54	63	533	52	75	43	6	57
		16/03/2021	**0089_MW203_210316**	**EP2102837**	<1	345	<1	345	9.51	10.5	44	4.84	66	552	194	80	47	7	56
		9/06/2021	**0089_MW203_210609**	**EP2106514**	<1	274	<1	274	7.83	10.1	45	12.5	52	564	33	87	41	5	51
		30/08/2021	**0089_MW203_210830**	**EP2110019**	<1	292	<1	292	7.97	8.63	44	3.97	43			75	37	4	40
Helicopter Support Facility	**MW214**	**2/08/2017**	**0089_MW214_S_170802**	**198991**		290					400	0.95				140	29	4.9	210
		1/09/2021	**0089_MW214_210901**	**EP2110159**	<1	558	<1	558	31.8	27.1	721	7.95	14			206	52	9	283
Helicopter Support Facility	**MW215**	**2/08/2017**	**0089_MW215_S_170802**	**198991**		200					160	5.3				100	18	4.4	80
		1/09/2021	**0089_MW215_210901**	**EP2110159**	<1	324	<1	324	14.2	12.5	229	6.28	59			116	27	5	100
Helicopter Support Facility	**MW216**	**2/08/2017**	**0089_MW216_S_170802**	**198991**		280					130	3.4				87	26	3.1	99
		11/09/2017	**0089_MW216_S_170911**	**175533**															
		16/10/2017	**0089_MW216_S_171016**	**177956**															
		17/11/2017	**0089_MW216_S_171117**	**203443**															
		5/12/2017	**0089_MW216_S_171205**	**204183**															
		15/01/2018	**0089_MW216_S_180115**	**205568**															
		19/12/2019	**0089_MW216_191219**	**EP1913598**	<1	258	<1	258	12.0	11.9	198	0.16	59	846	433	103	26	5	104
		31/03/2020	**0089_MW216_200331**	**EP2003366**	<1	240	<1	240	16.4	16.8	371	1.26	56	1,040	50	140	41	7	145
		22/07/2020	**0089_MW216_200722**	**EP2007667**	<1	287	<1	287	15.8	15.4	312	1.26	62	1,090	796	130	36	6	134
		15/12/2020	**0089_MW216_201215**	**EP2014041**	<1	354	<1	354	17.3	16.8	309	1.21	71	1,060	2,060	148	41	7	136
		18/03/2021	**0089_MW216_210318**	**EP2102955**	<1	318	<1	318	16.7	16.5	309	0.72	80	1,070	486	135	40	8	144
		9/06/2021	**0089_MW216_210609**	**EP2106514**	<1	310	<1	310	17.8	17.4	361	1.36	70	1,080	252	144	40	7	154
		31/08/2021	**0089_MW216_210831**	**EP2110071**	<1	313	<1	313	19.2	16.6	407	7.23	68			128	38	7	158
Helicopter Support Facility	**MW217**	**2/08/2017**	**0089_MW217_S_170802**	**198991**		300					54	5.7				120	15	2.5	40
		11/09/2017	**0089_MW217_S_170911**	**175533**															
		16/10/2017	**0089_MW217_S_171016**	**177956**															
		17/11/2017	**0089_MW217_S_171117**	**203443**															
		5/12/2017	**0089_MW217_S_171205**	**204183**															
		15/01/2018	**0089_MW217_S_180115**	**205568**															
		19/12/2019	**0089_MW217_191219**	**EP1913595**	<1	236	<1	236	6.21	6.05	45	1.33	11	353	556	80	8	2	31
		31/03/2020	**0089_MW217_200331**	**EP2003366**	<1	162	<1	162	4.36	4.83	36	5.16	5	289	1,900	64	5	2	27
		22/07/2020	**0089_MW217_200722**	**EP2007667**	<1	250	<1	250	6.70	6.82	47	0.96	18	344	248	92	9	4	32
		24/09/2020	**0089_MW217_200924**	**EP2010271**	<1	234	<1	234	6.35	6.41	52	0.48	10	340	186	85	8	3	33
		15/12/2020	**0089_MW217_201215**	**EP2014041**	<1	204	<1	204	5.29	5.32	37	0.36	8	274	175	74	6	2	25
		18/03/2021	**0089_MW217_210318**	**EP2102955**	<1	292	<1	292	7.31	6.85	39	3.24	18	355	78	93	9	3	32
		9/06/2021	**0089_MW217_210609**	**EP2106514**	<1	240	<1	240	6.57	7.70	52	7.89	15	472	60	105	11	3	34
		31/08/2021	**0089_MW217_210831**	**EP2110064**	<1	276	<1	276	7.70	8.03	51	2.09	36			104	11	6	41
Helicopter Support Facility	**MW220**	**26/02/2016**	**HDF_MB50**	**EP1601702**															
		4/11/2016	**HSF_MB50**	**522565**															
		2/08/2017	**0089_MW220_S_170802**	**198991**		420					290	7.5				200	30	23	170
		11/09/2017	**0089_MW220_S_170911**	**175533**															
		16/10/2017	**0089_MW220_S_171016**	**177956**															
		17/11/2017	**0089_MW220_S_171117**	**203443**															
		5/12/2017	**0089_MW220_S_171205**	**204183**															
		15/01/2018	**0089_MW220_S_180115**	**205568**															
		9/06/2021	**0089_MW220_210609**	**EP2106514**															
Helicopter Support Facility	**MW224**	**9/08/2017**	**0089_MW224_S_170809**	**199252**		280					120	-0.52				79	26	3.3	83
		19/12/2019	**0089_MW224_191219**	**EP1913595**	<1	206	<1	206	7.39	8.31	94	5.85	30	467	1,220	67	20	4	74
		31/03/2020	**0089_MW224_200331**	**EP2003366**	<1	222	<1	222	8.29	8.86	113	3.30	32	514	1,280	72	22	4	77
		22/07/2020	**0089_MW224_200722**	**EP2007667**	<1	241	<1	241	9.08	9.27	124	1.03	37	439	358	70	23	4	87
		24/09/2020	**0089_MW224_200924**	**EP2010273**	<1	231	<1	231	8.85	9.23	122	2.13	38	526	615	70	22	4	88
		15/12/2020	**0089_MW224_201215**	**EP2014041**	<1	237	<1	237	8.52	8.55	109	0.20	34	482	247	64	20	4	83
		18/03/2021	**0089_MW224_210318**	**EP2102955**	<1	214	<1	214	8.28	8.59	114	1.82	38	482	216	63	20	4	85
		9/06/2021	**0089_MW224_210609**	**EP2106514**	<1	216	<1	216	8.29	8.85	112	3.30	39	504	121	64	21	4	88
		31/08/2021	**0089_MW224_210831**	**EP2110064**	<1	225	<1	225	8.83	8.24	125	3.50	39			56	21	4	83
		2/08/2017	**0089_MW225_S_170802**	**198991**		270					380	1.4				120	39	4.8	190

					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
Helicopter Support Facility	**MW225**	**11/09/2017**	**0089_MW225_S_170911**	**175533**															
		19/10/2017	**0089_MW225_S_171019**	**178275**															
		17/11/2017	**0089_MW225_S_171117**	**203443**															
		5/12/2017	**0089_MW225_S_171205**	**204183**															
		15/01/2018	**0089_MW225_S_180115**	**205568**															
		1/09/2021	**0089_MW225_210901**	**EP2110160**	<1	302	<1	302	22.0	18.6	522	8.23	58			134	39	8	196
Helicopter Support Facility	**MW226**	**2/08/2017**	**0089_MW226_S_170802**	**198991**		630					15,000	0.78				400	1,000	340	9,000
		11/09/2017	**0089_MW226_S_170911**	**175533**															
		19/10/2017	**0089_MW226_S_171019**	**178275**															
		17/11/2017	**0089_MW226_S_171117**	**203443**															
		5/12/2017	**0089_MW226_S_171205**	**204183**															
		15/01/2018	**0089_MW226_S_180115**	**205568**															
		14/01/2020	**0089_MW226_200114**	**EP2000432**	<1	540	<1	540	434	481	13,400	5.05	2,190	30,900	440	455	1,150	479	8,070
		2/04/2020	**0089_MW226_200402**	**EP2003472**	<1	612	<1	612	476	560	14,600	8.07	2,500	29,500	146	482	1,290	601	9,520
		21/07/2020	**0089_MW226_200721**	**EP2007611**	<1	621	<1	621	465	524	14,400	5.96	2,230	31,600	62	446	1,200	534	8,950
		22/09/2020	**0089_MW226_200922**	**EP2010143**	<1	637	<1	637	484	415	15,100	7.64	2,180	31,700	54	347	944	433	7,110
		15/12/2020	**0089_MW226_201215**	**EP2014042**	<1	553	<1	553	475	512	14,700	3.82	2,350	29,400	184	452	1,210	529	8,660
		17/03/2021	**0089_MW226_210317**	**EP2102900**	<1	542	<1	542	459	509	14,200	5.14	2,300	32,600	94	444	1,170	546	8,660
		10/06/2021	**0089_MW226_210610**	**EP2106588**	<1	561	<1	561	476	535	14,800	5.88	2,250	31,200	88	452	1,250	538	9,100
		31/08/2021	**0089_MW226_210831**	**EP2110071**	<1	666	<1	666	457	462	14,200	0.46	2,090			388	1,080	450	7,860
Helicopter Support Facility	**MW227**	**2/08/2017**	**0089_MW227_S_170802**	**198991**		350					1,400	0.97				140	87	28	820
		11/09/2017	**0089_MW227_S_170911**	**175533**															
		19/10/2017	**0089_MW227_S_171019**	**178275**															
		17/11/2017	**0089_MW227_S_171117**	**203443**															
		5/12/2017	**0089_MW227_S_171205**	**204183**															
		15/01/2018	**0089_MW227_S_180115**	**205568**															
		1/04/2020	**0089_MW227_200401**	**EP2003417**	<1	464	<1	464	37.7	35.0	886	3.75	164	2,170	3,240	134	74	27	494
		22/07/2020	**0089_MW227_200722**	**EP2007648**	<1	332	<1	332	31.1	30.0	768	1.76	135	1,710	92	121	60	24	424
		21/09/2020	**0089_MW227_200921**	**EP2010085**	<1	361	<1	361	31.4	31.3	711	0.25	200	1,820	225	130	69	21	427
		15/12/2020	**0089_MW227_201215**	**EP2014051**	<1	375	<1	375	37.4	38.3	910	1.21	204	2,160	111	121	68	25	599
		15/03/2021	**0089_MW227_210315**	**EP2102752**	<1	528	<1	528	53.3	52.8	1,240	0.46	373	3,270	57	188	126	22	747
		10/06/2021	**0089_MW227_210610**	**EP2106588**	<1	315	<1	315	50.1	54.5	1,410	4.22	193	3,340	60	132	99	53	883
		31/08/2021	**0089_MW227_210831**	**EP2110071**	<1	360	<1	360	38.2	34.5	940	5.10	217			142	83	40	450
Helicopter Support Facility	**MW228**	**2/08/2017**	**0089_MW228_S_170802**	**198991**		380					10,000	4.0				360	750	200	6,300
		11/09/2017	**0089_MW228_S_170911**	**175533**															
		19/10/2017	**0089_MW228_S_171019**	**178275**															
		17/11/2017	**0089_MW228_S_171117**	**203443**															
		5/12/2017	**0089_MW228_S_171205**	**204183**															
		15/01/2018	**0089_MW228_S_180115**	**205568**															
		14/01/2020	**0089_MW228_200114**	**EP2000432**	<1	612	<1	612	232	283	6,930	9.94	1,160	14,700	54	294	642	264	4,800
		1/04/2020	**0089_MW228_200401**	**EP2003417**	<1	717	<1	717	310	320	9,490	1.44	1,370	15,200	234	301	724	327	5,440
		22/07/2020	**0089_MW228_200722**	**EP2007648**	<1	418	<1	418	331	377	10,300	6.53	1,550	24,000	76	325	836	328	6,530
		21/09/2020	**0089_MW228_200921**	**EP2010085**	<1	505	<1	505	290	279	8,840	1.92	1,460	20,000	334	271	651	256	4,720
		15/12/2020	**0089_MW228_201215**	**EP2014047**	<1	419	<1	419	311	321	9,600	1.69	1,510	21,500	154	307	772	296	5,400
		15/03/2021	**0089_MW228_210315**	**EP2102752**	<1	491	<1	491	323	331	10,000	1.28	1,490	21,400	313	299	777	296	5,630
		10/06/2021	**0089_MW228_210610**	**EP2106588**	<1	328	<1	328	356	355	11,300	0.18	1,500	23,100	393	310	830	324	6,050
		31/08/2021	**0089_MW228_210831**	**EP2110071**	<1	606	<1	606	228	241	6,910	2.84	1,010			215	536	202	4,170
		8/08/2017	**0089_MW233_S_170808**	**199212**		150					22	-1.5				45	6.9	4	17
		13/09/2017	**0089_MW233_S_170913**	**175739**															
		20/10/2017	**0089_MW233_S_171020**	**178263**															
		21/11/2017	**0089_MW233_S_171121**	**203587**															
		5/12/2017	**0089_MW233_S_171205**	**204183**															
		19/01/2018	**0089_MW233_S_180119**	**205805**															
AT storage, fuel farm and infiltration s	**MW233**	**8/01/2020**	**0089_MW233_200108**	**EP2000182**	<1	170	<1	170	4.57	4.52	29	0.48	17	258	295	58	8	4	20
		30/03/2020	**0089_MW233_200330**	**EP2003313**	<1	125	<1	125	3.14	3.60	14	6.79	12	168	84	48	6	4	14
		15/07/2020	**0089_MW233_200715**	**EP2007385**	<1	139	<1	139	3.62	3.62	24	0.04	8	190	59	48	6	3	15
		21/09/2020	**0089_MW233_200921**	**EP2010085**	<1	150	<1	150	3.90	3.83	27	0.97	7	192	118	47	6	3	21
		15/12/2020	**0089_MW233_201215**	**EP2014041**	<1	152	<1	152	3.70	4.17	19	5.97	6	196	30	53	7	3	20
		15/03/2021	**0089_MW233_210315**	**EP2102755**	<1	127	<1	127	3.06	3.49	15	6.53	5	180	46	42	6	3	19
		9/06/2021	**0089_MW233_210609**	**EP2106515**	<1	121	<1	121	2.92	3.01	14	1.60	5	186	80	38	5	2	15
		30/08/2021	**0089_MW233_210830**	**EP2110016**	<1	107	<1	107	3.16	3.14	29	0.43	10			40	5	3	15
		8/08/2017	**0089_MW236_S_170808**	**199212**		280					36	7.1				110	17	0.9	21
		13/09/2017	**0089_MW236_S_170913**	**175739**															
		20/10/2017	**0089_MW236_S_171020**	**178263**															
		21/11/2017	**0089_MW236_S_171121**	**203587**															
		5/12/2017	**0089_MW236_S_171205**	**204183**															
		19/01/2018	**0089_MW236_S_180119**	**205805**															
AT storage, fuel farm and infiltration s	**MW236**	**2/04/2020**	**0089_MW236_200402**	**EP2003472**	<1	254	<1	254	6.18	6.68	26	3.84	18	339	150	94	14	2	18
		16/07/2020	**0089_MW236_200716**	**EP2007438**	<1	342	<1	342	8.17	7.00	32	7.76	21	348	162	97	15	2	20
		21/09/2020	**0089_MW236_200921**	**EP2010077**	<1	260	<1	260	6.65	6.88	36	1.76	21	390	168	94	16	2	19
		15/12/2020	**0089_MW236_201215**	**EP2014041**	<1	244	<1	244	6.25	6.71	37	3.53	16	352	184	93	15	2	18
		16/03/2021	**0089_MW236_210316**	**EP2102833**	<1	238	<1	238	6.28	7.15	40	6.47	19	425	94	95	17	2	22
		10/06/2021	**0089_MW236_210610**	**EP2106579**	<1	243	<1	243	6.20	7.12	36	6.86	16	420	85	97	17	2	19
		31/08/2021	**0089_MW236_210831**	**EP2110073**	<1	244	<1	244	7.20	8.42	58	7.82	33			105	19	2	36
		4/08/2017	**0089_MW238_S_170804**	**199095**		200					33	8.4				88	16	2.6	23
		13/09/2017	**0089_MW238_S_170913**	**175739**															
		20/10/2017	**0089_MW238_S_171020**	**178263**															
		21/11/2017	**0089_MW238_S_171121**	**203587**															
		5/12/2017	**0089_MW238_S_171205**	**204183**															
		19/01/2018	**0089_MW238_S_180119**	**205805**															
AT storage, fuel farm and infiltration s	**MW238**	**14/01/2020**	**0089_MW238_200114**	**EP2000432**	<1	170	<1	170	7.43	8.38	118	5.98	34	484	54	75	18	6	69
		1/04/2020	**0089_MW238_200401**	**EP2003438**	<1	200	<1	200	6.74	8.03	34	8.69	86	415	6	100	19	5	31
		16/07/2020	**0089_MW238_200716**	**EP2007438**	<1	215	<1	215	7.05	7.20	38	1.01	81	402	336	88	17	4	30
		21/09/2020	**0089_MW238_200921**	**EP2010077**	<1	206	<1	206	6.63	7.15	39	3.79	68	440	208	88	17	4	29
		15/12/2020	**0089_MW238_201215**	**EP2014041**	<1	190	<1	190	5.87	6.84	38	7.66	48	434	286	86	16	4	26
		18/03/2021	**0089_MW238_210318**	**EP2102955**	<1	189	<1	189	6.44	7.37	34	6.70	82	396	42	91	18	5	28
		10/06/2021	**0089_MW238_210610**	**EP2106580**	<1	198	<1	198	6.60	7.27	42	4.82	70	460	169	86	18	4	32
		31/08/2021	**0089_MW238_210831**	**EP2110073**	<1	180	<1	180	5.44	6.77	47	10.9	25			88	14	2	27
		4/08/2017	**0089_MW239_S_170804**	**199095**		240					32	7.3				100	17	2.7	24
AT storage, fuel farm and infiltration s	**MW239**	**22/07/2020**	**0089_MW239_200722**	**EP2007648**	<1	225	<1	225	6.54	7.08	35	3.95	51	406	64	93	15	3	26
		21/09/2020	**0089_MW239_200921**	**EP2010077**	<1	220	<1	220	6.51	6.84	33	2.44	57	396	49	89	15	3	25
		15/12/2020	**0089_MW239_201215**	**EP2014041**	<1	221	<1	221	6.64	7.39	31	5.35	65	390	37	93	19	4	25
		18/03/2021	**0089_MW239_210318**	**EP2102954**	<1	217	<1	217	6.87	7.48	30	4.25	81	400	19	88	22	4	27
		10/06/2021	**0089_MW239_210610**	**EP2106579**	<1	225	<1	225	7.00	7.26	32	1.82	77	412	69	82	23	4	27
		31/08/2021	**0089_MW239_210831**	**EP2110073**	<1	199	<1	199	5.81	6.21	34	3.32	42			78	14	3	25
		4/08/2017	**0089_MW240_S_170804**	**199095**		280					43	11				140	16	3.3	26
		14/01/2020	**0089_MW240_200114**	**EP2000432**	<1	254	<1	254						720	50	119	19	5	85
		1/04/2020	**0089_MW240_200401**	**EP2003438**	<1	320	<1	320	9.00	8.59	51	2.32	56	512	8	117	14	3	35
AT storage, fuel farm and infiltration s	**MW240**	**16/07/2020**	**0089_MW240_200716**	**EP2007438**	<1	262	<1	262	8.11	8.52	46	2.43	76	452	34	117	16	4	29
		21/09/2020	**0089_MW240_200921**	**EP2010077**	<1	267	<1	267	7.74	8.48	47	4.53	52	566	20	120	14	3	29
		15/12/2020	**0089_MW240_201215**	**EP2014041**	<1	251	<1	251	7.39	8.35	43	6.06	56	535	46	120	14	3	26
		18/03/2021	**0089_MW240_210318**	**EP2102954**	<1	241	<1	241	8.08	9.36	78	7.34	51	650	241	131	14	4	36
		10/06/2021	**0089_MW240_210610**	**EP2106580**	<1	249	<1	249	8.12	9.08	59	5.63	71	620	89	124	16	4	34
		31/08/2021	**0089_MW240_210831**	**EP2110073**	<1	263	<1	263	7.67	8.57	54	5.52	43			122	12	4	32
		7/08/2017	**0089_MW242_S_170807**	**199149**		230					43	5.5				90	14	2.6	31
		8/01/2020	**0089_MW242_200108**	**EP2000182**	<1	185	<1	185	4.70	4.94	18	2.44	24	290	29	69	11	1	13
		30/03/2020	**0089_MW242_200330**	**EP2003313**	<1	181	<1	181	4.81	5.67	23	8.26	26	270	<5	77	12	4	17
AT storage, fuel farm and infiltration s	**MW242**	**16/07/2020**	**0089_MW242_200716**	**EP2007438**	<1	206	<1	206	5.78	5.94	36	1.37	31	330	6	79	12	2	22
		21/09/2020	**0089_MW242_200921**	**EP2010077**	<1	212	<1	212	6.10	6.51	41	3.27	34	379	38	82	14	2	28
		15/12/2020	**0089_MW242_201215**	**EP2014041**	<1	198	<1	198	5.58	6.24	36	5.66	29	362	51	80	13	2	26
		18/03/2021	**0089_MW242_210318**	**EP2102954**	<1	183	<1	183	4.94	5.41	25	4.54	28	283	82	72	12	2	18
		9/06/2021	**0089_MW242_210609**	**EP2106516**	<1	188	<1	188	5.53	5.65	40	1.08	31			67	12	4	28
		31/08/2021	**0089_MW242_210831**	**EP2110073**	<1	210	<1	210	7.69	9.34	87	9.71	50			97	22	5	59
		4/08/2017	**0089_MW243_S_170804**	**199095**		300					42	7.1				120	17	3.8	29

Table 1 Groundwater Analytical Results

					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
AT storage, fuel farm and infiltration s	MW243	13/09/2017	0089_MW243_S_170913	175739															
		20/10/2017	0089_MW243_S_171020	178263															
		21/11/2017	0089_MW243_S_171121	203587															
		5/12/2017	0089_MW243_S_171205	204183															
		19/01/2018	0089_MW243_S_180119	205805															
		14/01/2020	0089_MW243_200114	EP2000432	<1	255	<1	255	7.09	7.38	53	2.01	24	456	221	100	13	4	28
		1/04/2020	0089_MW243_200401	EP2003438	<1	226	<1	226	6.80	7.35	56	3.85	34	462	19	95	13	4	33
		16/07/2020	0089_MW243_200716	EP2007438	<1	260	<1	260	7.52	8.00	52	3.16	41	447	154	106	14	5	33
		21/09/2020	0089_MW243_200921	EP2010077	<1	255	<1	255	7.44	8.16	58	4.59	34	490	54	107	15	4	34
		15/12/2020	0089_MW243_201215	EP2014041	<1	253	<1	253	7.67	8.78	55	6.76	51	536	41	117	16	4	35
		18/03/2021	0089_MW243_210318	EP2102955	<1	263	<1	263	8.24	9.38	63	6.45	58	550	20	122	18	6	38
		10/06/2021	0089_MW243_210610	EP2106579	<1	258	<1	258	7.26	8.13	42	5.70	44	469	93	106	16	7	31
		31/08/2021	0089_MW243_210831	EP2110073	<1	252	<1	252	7.36	8.41	55	6.69	37			112	15	6	33
AT storage, fuel farm and infiltration s	MW245	4/08/2017	0089_MW245_S_170804	199095		550					21	3.7				200	19	2.4	17
		13/09/2017	0089_MW245_S_170913	175739															
		20/10/2017	0089_MW245_S_171020	178263															
		21/11/2017	0089_MW245_S_171121	203587															
		5/12/2017	0089_MW245_S_171205	204183															
		19/01/2018	0089_MW245_S_180119	205805															
		14/01/2020	0089_MW245_200114	EP2000432	<1	320	<1	320	7.18	7.66	25	3.23	4	392	64	110	13	4	23
		1/04/2020	0089_MW245_200401	EP2003438	<1	408	<1	408	8.69	10.1	19	7.45	<1	484	32	154	16	5	22
		16/07/2020	0089_MW245_200716	EP2007438	<1	555	<1	555	12.6	12.7	49	0.58	4	755	40	174	18	9	53
		21/09/2020	0089_MW245_200921	EP2010077	<1	612	<1	612	13.2	11.6	33	6.27	2	675	112	167	19	7	36
		15/12/2020	0089_MW245_201215	EP2014041	<1	441	<1	441	9.64	9.39	28	1.31	2	540	30	136	15	6	28
		18/03/2021	0089_MW245_210318	EP2102955	<1	494	<1	494	10.5	9.56	20	4.56	2	512	24	142	15	6	25
		10/06/2021	0089_MW245_210610	EP2106579	<1	601	<1	601	12.7	12.3	23	1.52	3	753	34	187	22	6	24
		31/08/2021	0089_MW245_210831	EP2110073	<1	315	<1	315	7.56	8.05	33	3.14	16			118	14	2	22
AT storage, fuel farm and infiltration s	MW248	7/08/2017	0089_MW248_S_170807	199149		450					120	0.97				150	40	6.3	90
		13/09/2017	0089_MW248_S_170913	175739															
		20/10/2017	0089_MW248_S_171020	178263															
		21/11/2017	0089_MW248_S_171121	203587															
		5/12/2017	0089_MW248_S_171205	204183															
		19/01/2018	0089_MW248_S_180119	205805															
		8/01/2020	0089_MW248_200108	EP2000182	<1	450	<1	450	13.3	13.1	112	0.71	55	761	93	113	41	7	90
		1/04/2020	0089_MW248_200401	EP2003438	<1	453	<1	453	13.2	12.1	104	4.33	60	732	28	98	42	7	83
		22/07/2020	0089_MW248_200722	EP2007667	<1	537	<1	537	20.2	17.3	295	7.67	54	1,030	14	138	64	9	113
		21/09/2020	0089_MW248_200921	EP2010077	<1	551	<1	551	25.3	22.1	368	6.78	188	1,240	38	143	64	20	211
		15/12/2020	0089_MW248_201215	EP2014041	<1	460	<1	460	22.1	21.0	306	2.60	207	1,260	26	143	59	21	195
		18/03/2021	0089_MW248_210318	EP2102954	<1	437	<1	437	18.6	18.6	164	<0.01	253	1,060	<5	133	53	21	163
		9/06/2021	0089_MW248_210609	EP2106516	<1	428	<1	428	16.2	15.9	141	1.18	179	934	7	121	46	19	128
AT storage, fuel farm and infiltration s	MW249	7/08/2017	0089_MW249_S_170807	199149		540					300	-2.6				100	36	14	270
		13/09/2017	0089_MW249_S_170913	175739															
		20/10/2017	0089_MW249_S_171020	178263															
		21/11/2017	0089_MW249_S_171121	203587															
		5/12/2017	0089_MW249_S_171205	204183															
		19/01/2018	0089_MW249_S_180119	205805															
		8/01/2020	0089_MW249_200108	EP2000182	<1	470	<1	470	14.0	12.0	124	7.82	54	704	210	85	33	11	109
		30/03/2020	0089_MW249_200330	EP2003313	<1	398	<1	398	12.6	13.3	124	2.98	54	651	74	105	38	11	108
		16/07/2020	0089_MW249_200716	EP2007438	<1	433	<1	433	13.3	12.9	103	1.60	86	688	121,000	104	37	10	102
		21/09/2020	0089_MW249_200921	EP2010077	<1	465	<1	465	15.1	13.5	168	5.48	51	853	7,190	96	34	11	130
		15/12/2020	0089_MW249_201215	EP2014041	<1	449	<1	449	12.3	11.3	103	4.27	22	636	146	85	32	9	97
		15/03/2021	0089_MW249_210315	EP2102755	<1	418	<1	418	12.6	12.5	130	0.38	29	699	1,080	92	37	11	106
		9/06/2021	0089_MW249_210609	EP2106515	<1	435	<1	435	13.4	12.6	150	3.27	25	724	1,610	91	35	10	113
		31/08/2021	0089_MW249_210831	EP2110071	<1	426	<1	426	13.5	12.9	130	2.42	64			119	40	3	82
station, dredge soil and ship sullage a	MW255	4/08/2017	0089_MW255_S_170804	199095		380					100	3.9				130	32	2.6	69
		13/09/2017	0089_MW255_S_170913	175739															
		20/10/2017	0089_MW255_S_171020	178263															
		21/11/2017	0089_MW255_S_171121	203587															
		8/12/2017	0089_MW255_S_171208	204353															
		19/01/2018	0089_MW255_S_180119	205805															
		16/07/2020	0089_MW255_200716	EP2007438	<1	454	<1	454	12.0	10.5	76	6.37	36	614	6,450	117	19	5	69
		22/09/2020	0089_MW255_200922	EP2010141	<1	486	<1	486	12.4	10.2	72	9.76	34	624	3,100	103	28	2	63
		16/12/2020	0089_MW255_201216	EP2014106	<1	384	<1	384	10.8	10.6	88	0.95	33	607	1,810	116	21	3	70
		17/03/2021	0089_MW255_210317	EP2102900	<1	410	<1	410	10.8	9.83	65	4.77	38	540	986	106	18	4	68
		10/06/2021	0089_MW255_210610	EP2106580	<1	352	<1	352	9.46	9.34	64	0.63	30	554	7,590	98	18	4	66
		31/08/2021	0089_MW255_210831	EP2110073	<1	382	<1	382	10.6	10.2	79	1.96	38			106	27	3	61
station, dredge soil and ship sullage a	MW256	4/08/2017	0089_MW256_S_170804	199095		340					33	2.3				120	16	1.4	20
		13/09/2017	0089_MW256_S_170913	175739															
		20/10/2017	0089_MW256_S_171020	178263															
		21/11/2017	0089_MW256_S_171121	203587															
		8/12/2017	0089_MW256_S_171208	204353															
		19/01/2018	0089_MW256_S_180119	205805															
		30/03/2020	0089_MW256_200330	EP2003313	<1	358	<1	358	18.0	17.3	352	1.95	46	1,030	173	149	41	4	148
		16/07/2020	0089_MW256_200716	EP2007438	<1	439	<1	439	11.3	11.3	84	0.02	7	578	67	152	20	4	45
		22/09/2020	0089_MW256_200922	EP2010141	<1	331	<1	331	10.8	9.42	101	6.59	62	540	77	112	15	3	58
		14/12/2020	0089_MW256_201214	EP2013975	<1	321	<1	321	12.2	12.4	181	0.42	35	650	316	126	18	4	103
		17/03/2021	0089_MW256_210317	EP2102900	<1	300	<1	300	13.6	12.7	239	3.23	40	775	222	111	17	5	130
		10/06/2021	0089_MW256_210610	EP2106579	<1	492	<1	492	15.2	15.1	184	0.32	7	819	267	150	41	3	95
		31/08/2021	0089_MW256_210831	EP2110064	<1	345	<1	345	19.6	17.3	403	6.27	64			149	27	9	170
station, dredge soil and ship sullage a	MW257	4/08/2017	0089_MW257_S_170804	199095		200					20	1.8				74	8.0	0.8	11
		13/09/2017	0089_MW257_S_170913	175739															
		20/10/2017	0089_MW257_S_171020	178263															
		21/11/2017	0089_MW257_S_171121	203587															
		8/12/2017	0089_MW257_S_171208	204353															
		19/01/2018	0089_MW257_S_180119	205805															
		19/12/2019	0089_MW257_191219	EP1913598	<1	144	<1	144	4.45	4.75	47	3.20	12	355	134	62	7	3	23
		2/04/2020	0089_MW257_200402	EP2003472	<1	175	<1	175	5.15	5.80	49	5.96	13	352	389	78	8	3	27
		16/07/2020	0089_MW257_200716	EP2007438	<1	178	<1	178	4.48	4.35	26	1.47	9	333	2,330	60	6	3	18
		22/09/2020	0089_MW257_200922	EP2010141	<1	159	<1	159	4.10	4.01	26	1.08	9	232	132	52	6	2	20
		16/12/2020	0089_MW257_201216	EP2014106	<1	180	<1	180	5.07	5.30	42	2.16	14	348	139	67	8	3	28
		18/03/2021	0089_MW257_210318	EP2102954	<1	193	<1	193	5.36	5.76	43	3.58	14	334	70	74	8	4	30
		9/06/2021	0089_MW257_210609	EP2106516	<1	158	<1	158	3.77	4.04	16	3.42	8	243	134	57	6	2	15
		31/08/2021	0089_MW257_210831	EP2110073	<1	111	<1	111	3.24	3.23	29	0.14	10			41	4	3	18
station, dredge soil and ship sullage a	MW258	4/08/2017	0089_MW258_S_170804	199095		320					110	5.9				120	28	11	83
		13/09/2017	0089_MW258_S_170913	175739															
		20/10/2017	0089_MW258_S_171020	178263															
		21/11/2017	0089_MW258_S_171121	203587															
		8/12/2017	0089_MW258_S_171208	204353															
		19/01/2018	0089_MW258_S_180119	205805															
station, dredge soil and ship sullage a	MW259	4/08/2017	0089_MW259_S_170804	199095		260					39	4.7				100	15	4.2	31
		13/09/2017	0089_MW259_S_170913	175739															
		20/10/2017	0089_MW259_S_171020	178263															
		21/11/2017	0089_MW259_S_171121	203587															
		8/12/2017	0089_MW259_S_171208	204353															
		19/01/2018	0089_MW259_S_180119	205805															
		16/07/2020	0089_MW259_200716	EP2007438	<1	232	<1	232	6.06	6.13	38	0.54	17	332	676	79	12	6	24
		22/09/2020	0089_MW259_200922	EP2010141	<1	238	<1	238	6.22	6.56	41	2.64	15	413	12,700	87	12	4	26
		16/12/2020	0089_MW259_201216	EP2014092	<1	291	<1	291	7.20	6.51	39	5.05	14	352	1,510	84	13	3	27
		18/03/2021	0089_MW259_210318	EP2102954	<1	206	<1	206	5.40	5.99	33	5.21	17	303	220	75	13	2	26
		10/06/2021	0089_MW259_210610	EP2106580	<1	224	<1	224	5.84	6.08	36	1.96	17	324	86	72	15	3	27
		31/08/2021	0089_MW259_210831	EP2110073	<1	207	<1	207	5.37	5.54	38	1.49	8			70	11	2	25
		12/01/2017	E06_B88_MB01_170112	530261										380					
		4/08/2017	0089_MW261_S_170804	199095		390					71	1.5				110	30	6.6	55
		26/09/2019	0089_MW261_190926	679542															

					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
		25/10/2019	0089_MW261_191025	EP1911020									118						
		19/12/2019	0089_MW261_191219	EP1913595	<1	404	<1	404	27.0	26.0	569	1.93	137	1,600	304	155	62	23	288
station, dredge soil and ship sullage a	MW261	30/03/2020	0089_MW261_200330	EP2003313	<1	444	<1	444	27.9	27.6	573	0.61	139	1,610	17	166	67	29	300
		21/07/2020	0089_MW261_200721	EP2007611	<1	437	<1	437	28.8	27.6	578	2.15	179	1,740	252	168	61	26	310
		22/09/2020	0089_MW261_200922	EP2010141	<1	470	<1	470	26.2	23.3	529	5.97	93	1,460	85	138	51	25	266
		16/12/2020	0089_MW261_201216	EP2014087	<1	416	<1	416	29.3	28.4	617	1.58	172	1,670	98	148	62	28	349
		18/03/2021	0089_MW261_210318	EP2102954	<1	396	<1	396	30.2	29.2	668	1.85	168	1,670	33	145	61	28	372
		9/06/2021	0089_MW261_210609	EP2106516	<1	408	<1	408	29.0	28.5	615	0.88	167	1,690	16	143	59	27	363
		31/08/2021	0089_MW261_210831	EP2110073	<1	422	<1	422	25.0	22.1	502	6.03	115			134	42	22	263
		1/08/2017	0089_MW264_S_170801	198918		440					120	0.34				91	37	16	130
		19/09/2017	0089_MW264_S_170919	176140															
		16/10/2017	0089_MW264_S_171016	177956															
		17/11/2017	0089_MW264_S_171117	203443															
		7/12/2017	0089_MW264_S_171207	204323															
		16/01/2018	0089_MW264_S_180116	205631															
station, dredge soil and ship sullage a	MW264	19/12/2019	0089_MW264_191219	EP1913595	<1	422	<1	422	12.7	12.6	96	0.15	74	704	305	91	48	16	86
		30/03/2020	0089_MW264_200330	EP2003313	<1	376	<1	376	14.1	14.3	182	0.75	68	724	30	106	45	16	112
		16/07/2020	0089_MW264_200716	EP2007438	<1	435	<1	435	14.9	13.8	171	3.68	65	718	103	102	45	16	106
		22/09/2020	0089_MW264_200922	EP2010141	<1	353	<1	353	14.6	13.9	218	2.22	65	800	88	100	34	12	134
		14/12/2020	0089_MW264_201214	EP2013975	<1	440	<1	440	13.1	13.0	105	0.33	66	634	265	95	48	17	90
		18/03/2021	0089_MW264_210318	EP2102954	<1	438	<1	438	13.1	12.1	108	3.81	62	624	91	89	38	15	96
		9/06/2021	0089_MW264_210609	EP2106515	<1	388	<1	388	11.8	11.4	98	1.60	61	644	176	82	36	14	92
		31/08/2021	0089_MW264_210831	EP2110073	<1	310	<1	310	23.2	20.9	567	5.42	51			122	45	11	248
		1/08/2017	0089_MW268_S_170801	198918		500					3,000	3.4				200	270	70	1,900
		19/09/2017	0089_MW268_S_170919	176140															
		16/10/2017	0089_MW268_S_171016	177956															
		17/11/2017	0089_MW268_S_171117	203443															
		7/12/2017	0089_MW268_S_171207	204323															
		16/01/2018	0089_MW268_S_180116	205631															
station, dredge soil and ship sullage a	MW268	19/12/2019	0089_MW268_191219	EP1913595	<1	458	<1	458	50.0	48.5	974	1.49	642	3,090	478	173	164	32	588
		30/03/2020	0089_MW268_200330	EP2003313	<1	563	<1	563	66.4	69.3	1,520	2.09	592	4,080	98	178	200	65	972
		21/07/2020	0089_MW268_200721	EP2007611	<1	536	<1	536	89.1	87.1	2,340	1.14	595	5,200	150	187	222	81	1,320
		21/09/2020	0089_MW268_200921	EP2010085	<1	460	<1	460	77.6	87.0	1,940	5.69	660	5,340	288	197	228	74	1,300
		14/12/2020	0089_MW268_201214	EP2013975	<1	436	<1	436	101	109	2,780	3.83	664	6,000	300	197	273	91	1,710
		16/03/2021	0089_MW268_210316	EP2102837	<1	421	<1	421	116	119	3,270	1.54	730	7,250	72	206	292	116	1,890
		9/06/2021	0089_MW268_210609	EP2106515	<1	413	<1	413	130	128	3,770	0.45	728	8,430	70	211	302	107	2,080
		31/08/2021	0089_MW268_210831	EP2110073	<1	474	<1	474	61.1	63.9	1,250	2.24	788			205	211	50	806
		1/08/2017	0089_MW269_S_170801	198918		370					270	3.4				90	40	13	220
		19/09/2017	0089_MW269_S_170919	176140															
		16/10/2017	0089_MW269_S_171016	177956															
		17/11/2017	0089_MW269_S_171117	203443															
		7/12/2017	0089_MW269_S_171207	204323															
		16/01/2018	0089_MW269_S_180116	205631															
station, dredge soil and ship sullage a	MW269	19/12/2019	0089_MW269_191219	EP1913595	<1	384	<1	384	16.6	14.9	251	5.48	89	859	293	52	42	17	193
		30/03/2020	0089_MW269_200330	EP2003313	<1	377	<1	377	17.5	16.6	297	2.76	77	903	56	71	47	18	200
		21/07/2020	0089_MW269_200721	EP2007611	<1	450	<1	450	20.0	18.1	324	4.85	89	1,050	55	68	58	19	218
		21/09/2020	0089_MW269_200921	EP2010085	<1	404	<1	404	15.9	15.2	222	2.17	74	790	47	74	49	15	163
		14/12/2020	0089_MW269_201214	EP2013975	<1	390	<1	390	17.4	16.6	284	2.32	76	900	644	73	52	16	190
		16/03/2021	0089_MW269_210316	EP2102837	<1	464	<1	464	23.9	25.1	444	2.54	101	1,280	44	88	82	22	309
		9/06/2021	0089_MW269_210609	EP2106515	<1	443	<1	443	24.1	21.5	470	5.69	98	1,310	55	73	66	20	275
		31/08/2021	0089_MW269_210831	EP2110073	<1	424	<1	424	21.7	19.2	404	5.92	87			77	58	18	234
		1/08/2017	0089_MW272_S_170801	198918		180					18,000	2.0				420	1,200	330	10,000
		19/09/2017	0089_MW272_D_170919	176140															
		19/09/2017	0089_MW272_S_170919	176140															
		17/10/2017	0089_MW272_D_171017	177985															
		17/10/2017	0089_MW272_S_171017	177985															
		20/11/2017	0089_MW272_D_171120	203545															
		20/11/2017	0089_MW272_S_171120	203545															
		4/12/2017	0089_MW272_D_171204	204124															
		4/12/2017	0089_MW272_S_171204	204124															
		17/01/2018	0089_MW272_D_1801117	205691															
Demolition Ground	MW272	17/01/2018	0089_MW272_S_1801117	205691															
		1/02/2018	0089_MW272_D_180201	206292		170					18,000	0.20				390	1,200	350	10,000
		1/02/2018	0089_MW272_I_180201	206292		180					17,000	0.58				370	1,100	330	9,300
		1/02/2018	0089_MW272_S_180201	206292		230					13,000	-0.094				300	850	260	7,400
		8/01/2020	0089_MW272_200108	EP2000179	<1	222	<1	222	418	461	13,400	4.93	1,710	25,600	718	350	1,030	470	7,980
		30/03/2020	0089_MW272_200330	EP2003308	<1	258	<1	258	516	570	16,400	4.94	2,340	33,200	498	457	1,350	560	9,700
		20/07/2020	0089_MW272_200720	EP2007544	<1	117	<1	117	572	662	18,200	7.28	2,700	41,800	31	458	1,450	587	11,600
		22/09/2020	0089_MW272_200922	EP2010151	<1	113	<1	113	616	656	19,700	3.14	2,790	40,300	91	465	1,470	621	11,400
		14/12/2020	0089_MW272_201214	EP2013983	<1	175	<1	175	599	678	19,000	6.19	2,860	34,800	144	502	1,540	680	11,700
		16/03/2021	0089_MW272_210316	EP2102837	<1	271	<1	271	649	756	20,600	7.66	2,990	43,400	96	592	1,680	736	13,100
		8/06/2021	0089_MW272_210608	EP2106464	<1	154	<1	154	537	581	17,200	3.93	2,340	37,700	45	444	1,300	488	10,100
		31/08/2021	0089_MW272_210831	EP2110071	<1	400	<1	400	313	325	9,960	1.93	1,150			371	720	252	5,540
		11/09/2017	0089_MW282_S_170911	175533															
		16/10/2017	0089_MW282_S_171016	177956															
		17/11/2017	0089_MW282_S_171117	203443															
		5/12/2017	0089_MW282_S_171205	204183															
		15/01/2018	0089_MW282_S_180115	205568															
Helicopter Support Facility	MW282	19/12/2019	0089_MW282_191219	EP1913595	<1	510	<1	510	12.1	12.4	50	1.37	25	813	3,210	176	25	2	36
		31/03/2020	0089_MW282_200331	EP2003366	<1	562	<1	562	14.0	16.3	76	7.82	29	872	84	216	38	2	55
		22/07/2020	0089_MW282_200722	EP2007667	<1	565	<1	565	13.7	12.3	72	5.38	17	626	176	161	19	1	61
		24/09/2020	0089_MW282_200924	EP2010273	<1	490	<1	490	12.5	11.9	84	2.24	16	644	294	154	19	<1	62
		15/12/2020	0089_MW282_201215	EP2014041	<1	526	<1	526	12.5	13.8	57	4.74	19	790	1,600	187	26	1	52
		18/03/2021	0089_MW282_210318	EP2102955	<1	632	<1	632	15.8	16.8	102	2.74	17	872	883	222	33	<1	68
		9/06/2021	0089_MW282_210609	EP2106514	<1	571	<1	571	14.4	15.0	89	1.94	24	850	375	195	30	2	63
		31/08/2021	0089_MW282_210831	EP2110064	<1	492	<1	492	11.3	10.3	40	4.51	17			148	20	<1	30
		18/09/2017	0089_MW288_S_170918	176030															
		17/10/2017	0089_MW288_S_171017	177985															
		15/11/2017	0089_MW288_S_171115	203378															
Accommodation Area	MW288	7/12/2017	0089_MW288_S_171207	204323															
		15/01/2018	0089_MW288_S_180115	205568															
		15/07/2020	0089_MW288_200715	EP2007385	<1	270	<1	270	11.6	11.0	176	2.49	60	636	446	77	29	8	106
		17/03/2021	0089_MW288_210317	EP2102900	<1	213	<1	213	9.79	10.3	124	2.42	98	566	490	57	31	9	107
		31/08/2021	0089_MW288_210831	EP2110071	<1	272	<1	272	8.98	8.68	85	1.71	55			76	21	6	69
		18/09/2017	0089_MW289_S_170918	176030															
		17/10/2017	0089_MW289_S_171017	177985															
		15/11/2017	0089_MW289_S_171115	203378															
		7/12/2017	0089_MW289_S_171207	204323															
		15/01/2018	0089_MW289_S_180115	205568															
Accommodation Area	MW289	30/03/2020	0089_MW289_200330	EP2003313	<1	293	<1	293	11.5	12.2	163	2.72	52	795	9	128	28	2	79
		22/07/2020	0089_MW289_200722	EP2007667	<1	319	<1	319	10.7	11.4	107	2.92	65	576	14	114	28	7	74
		21/09/2020	0089_MW289_200921	EP2010077	<1	328	<1	328	9.71	9.81	53	0.49	80	574	478	92	27	10	63
		15/12/2020	0089_MW289_201215	EP2014042	<1	321	<1	321	9.02	9.56	46	2.90	63	556	112	94	25	8	60
		16/03/2021	0089_MW289_210316	EP2102837	<1	318	<1	318	8.72	9.76	41	5.64	58	516	58	109	24	5	51
		9/06/2021	0089_MW289_210609	EP2106516	<1	344	<1	344	10.1	10.7	65	2.84	66	548	38	93	30	10	76
		30/08/2021	0089_MW289_210830	EP2110016	<1	308	<1	308	9.18	10.6	68	7.26	53			119	27	4	54
		30/03/2020	0089_MW247_200330	EP2003313	<1	436	<1	436	13.8	14.4	138	2.35	56	734	137	104	55	16	99
		21/07/2020	0089_MW247_200721	EP2007611	<1	512	<1	512	19.8	18.7	252	3.06	120	1,120	302	137	55	20	156
	MW516	21/09/2020	0089_MW516_200921	EP2010077	<1	557	<1	557	16.9	15.6	159	4.06	62	872	985	139	46	15	103
		16/12/2020	0089_MW516_201216	EP2014087	<1	542	<1	542	15.6	15.6	140	0.02	42	894	1,500	156	40	12	98
		18/03/2021	0089_MW516_210318	EP2102954	<1	460	<1	460	13.5	14.1	131	2.22	28	738	54	144	33	12	89
		9/06/2021	0089_MW516_210609	EP2106515	<1	499	<1	499	15.8	15.5	149	0.90	79	934	124	147	40	15	104
		31/08/2021	0089_MW516_210831	EP2110073	<1	522	<1	522	24.0	24.4	356	0.93	168			225	58	23	180
		30/03/2020	0089_MW250_200330	EP2003313	<1	112	<1	112	3.50	3.81	41	4.23	5	206	113	38	6	1	32

Table 1 Groundwater Analytical Results

					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
station, dredge soil and ship sullage a	**MW517**	**16/07/2020**	**0089_MW250_200716**	**EP2007438**	<1	234	<1	234	6.80	6.94	71	1.04	6	370	494	78	9	2	52
		22/09/2020	**0089_MW517_200922**	**EP2010141**	<1	219	<1	219	6.45	6.68	70	1.71	5	359	850	71	10	2	52
		15/12/2020	**0089_MW517_201215**	**EP2014041**	<1	192	<1	192	5.50	5.29	56	1.90	4	299	284	57	8	2	40
		18/03/2021	**0089_MW517_210318**	**EP2102954**	<1	246	<1	246	7.14	7.41	76	1.82	4	398	306	82	9	2	58
		9/06/2021	**0089_MW517_210609**	**EP2106516**	<1	316	<1	316	8.88	10.0	86	6.11	7	562	107	119	13	3	68
		31/08/2021	**0089_MW517_210831**	**EP2110064**	<1	232	<1	232	11.5	9.88	231	7.44	15			81	17	5	99
station, dredge soil and ship sullage a	**MW518**	**30/03/2020**	**0089_MW260_200330**	**EP2003313**	<1	197	<1	197	11.5	12.4	193	3.81	100	656	44	83	38	9	112
		21/07/2020	**0089_MW260_200721**	**EP2007611**	<1	235	<1	235	15.1	14.8	294	0.97	102	1,010	149	99	45	12	135
		22/09/2020	**0089_MW518_200922**	**EP2010141**	<1	254	<1	254	19.8	18.9	429	2.30	125	1,310	831	112	56	15	191
		16/12/2020	**0089_MW518_201216**	**EP2014092**	<1	336	<1	336	23.3	22.5	451	1.73	184	1,470	1,310	132	68	18	226
		18/03/2021	**0089_MW518_210318**	**EP2102954**	<1	320	<1	320	23.8	22.7	504	2.20	151	1,440	308	123	66	18	246
		9/06/2021	**0089_MW518_210609**	**EP2106515**	<1	359	<1	359	22.1	20.2	412	4.58	160	1,320	219	112	59	17	214
		31/08/2021	**0089_MW518_210831**	**EP2110073**	<1	387	<1	387	20.0	19.0	325	2.37	148			123	61	18	171

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Drinking Water

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Table 2 Porewater Analytical Results

					PFAS - Perfluoroalkyl Carboxylic Acids														PFAS - (n-2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	N-2 Fluorotelomer sulfonic acid (4:2 FTS)	N-2 Fluorotelomer sulfonic acid (6:2 FTS)	N-2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																		0.07		
PFAS NEMP 2020 Interim Marine 99%									0.00023						19																				
PFAS NEMP 2020 Recreational Water															**10**																		**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																															
WWTP	PW304	17/04/2018	0089_PW304_180417	209522	<0.001	<0.001	0.005	<0.001	0.020	<0.002	0.033	0.10	0.10	0.003	0.003	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	0089_PW304_200108	EP2000186	<0.02	<0.02	<0.02	<0.02	0.09	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	0.09	0.09
		1/04/2020	0089_PW304_200401	EP2003438	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	0089_PW304_200720	EP2007544	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/09/2020	0089_PW304_200922	EP2010143	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	0089_PW304_201215	EP2014048	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		15/03/2021	0089_PW304_210315	EP2102755	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		10/06/2021	0089_PW304_210610	EP2106582	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/09/2021	0089_PW304_210901	EP2110155	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
HSF	PW306	18/04/2018	0089_PW306_180418	209573	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		10/01/2020	0089_PW306_200110	EP2000293	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/03/2020	0089_PW306_200331	EP2003366	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/07/2020	0089_PW306_200722	EP2007648	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	0089_PW306_200923	EP2010220	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	0089_PW306_201215	EP2014048	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	0089_PW306_210317	EP2102892	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		9/06/2021	0089_PW306_210609	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	0089_PW306_210831	EP2110072	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
HSF	PW307	30/04/2018	0089_PW307_180430	209959	<0.001	<0.001	<0.001	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		10/01/2020	0089_PW307_200110	EP2000293	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/03/2020	0089_PW307_200331	EP2003366	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/07/2020	0089_PW307_200722	EP2007648	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	0089_PW307_200923	EP2010220	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	0089_PW307_201215	EP2014053	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	0089_PW307_210317	EP2102892	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		9/06/2021	0089_PW307_210609	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	0089_PW307_210831	EP2110065	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
HSF	PW308	30/04/2018	0089_PW308_180430	209959	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		10/01/2020	0089_PW308_200110	EP2000293	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/04/2020	0089_PW308_200401	EP2003417	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/07/2020	0089_PW308_200722	EP2007648	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	0089_PW308_200923	EP2010217	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	0089_PW308_201215	EP2014053	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	0089_PW308_210317	EP2102892	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		9/06/2021	0089_PW308_210609	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	0089_PW308_210831	EP2110072	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
HSF	PW314	18/04/2018	0089_PW314_180418	209573	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		10/01/2020	0089_PW314_200110	EP2000293	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/03/2020	0089_PW314_200331	EP2003366	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/07/2020	0089_PW314_200722	EP2007648	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	0089_PW314_200923	EP2010220	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	0089_PW314_201215	EP2014048	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	0089_PW314_210317	EP2102892	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		9/06/2021	0089_PW314_210609	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	0089_PW314_210831	EP2110065	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
HSF	PW315	30/04/2018	0089_PW315_180430	209959	<0.001	<0.001	<0.001	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		10/01/2020	0089_PW315_200110	EP2000293	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/04/2020	0089_PW315_200401	EP2003417	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/07/2020	0089_PW315_200722	EP2007648	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	0089_PW315_200923	EP2010217	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	0089_PW315_201215	EP2014048	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	0089_PW315_210317	EP2102892	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		9/06/2021	0089_PW315_210609	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	0089_PW315_210831	EP2110072	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
HSF	PW316	30/04/2018	0089_PW316_180430	209959	<0.001	<0.001	<0.001	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		10/01/2020	0089_PW316_200110	EP2000293	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/04/2020	0089_PW316_200401	EP2003417	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/07/2020	0089_PW316_200722	EP2007648	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	0089_PW316_200923	EP2010217	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	0089_PW316_201215	EP2014053	<0.02	<0.02	<0.02	<0.02	0.10	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.1	0.10	0.10
		17/03/2021	0089_PW316_210317	EP2102892	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		9/06/2021	0089_PW316_210609	EP2106519	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	0089_PW316_210831	EP2110065	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Demolition ground	PW329	12/04/2018	0089_PW329_180412	209345	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		10/01/2020	0089_PW329_200110	EP2000252	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	0089_PW329_200330	EP2003308	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	0089_PW329_200720	EP2007544	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1

Table 2 Porewater Analytical Results

					PFAS - Perfluoroalkyl Carboxylic Acids														PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	1:2 Fluorotelomer sulfonic acid (4:2 FTS)	2:2 Fluorotelomer sulfonic acid (6:2 FTS)	3:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																	*0.07*		
PFAS NEMP 2020 Interim Marine 99%									0.00023						10																			
PFAS NEMP 2020 Recreational Water															10																	**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																														
Accomodation	PW346	17/04/2018	0089_PW346_180417	209522	<0.001	<0.001	0.006	<0.001	0.013	<0.002	0.005	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	0089_PW346_200108	EP2000186	0.03	0.04	0.38	0.03	1.85	<0.02	<0.1	<0.02	0.05	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***2.23***	2.33	2.40
		1/04/2020	0089_PW346_200401	EP2003438	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.01	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		15/07/2020	0089_PW346_200715	EP2007386	<0.02	<0.02	0.03	<0.02	0.07	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.1*	0.10	0.10
		22/09/2020	0089_PW346_200922	EP2010143	0.06	0.06	0.65	0.06	4.97	<0.02	<0.1	0.02	0.10	0.03	0.06	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***5.62***	5.89	6.06
		15/12/2020	0089_PW346_201215	EP2014044	0.07	0.07	0.45	0.03	2.71	<0.02	<0.1	<0.02	0.10	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	***3.16***	3.36	3.46
		17/03/2021	0089_PW346_210317	EP2102901	0.03	<0.02	0.07	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.12*	0.15	0.15
		10/06/2021	0089_PW346_210610	EP2106580	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		30/08/2021	0089_PW346_210830	EP2110017	<0.02	<0.02	0.05	<0.02	0.34	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.39*	0.39	0.39
WWTP	PW350	19/04/2018	0089_PW350_180419	209623	0.94	0.64	4.3	0.27	0.14	<0.002	0.16	0.25	1.4	0.13	0.27	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		30/01/2020	0089_PW350_200130	EP2001003	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		2/04/2020	0089_PW350_200402	EP2003476	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/07/2020	0089_PW350_200721	EP2007594	<0.02	<0.02	0.02	<0.02	0.09	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.11*	0.11	0.11
		23/09/2020	0089_PW350_200923	EP2010220	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		16/12/2020	0089_PW350_201216	EP2014090	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	0089_PW350_210317	EP2102901	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05
		8/06/2021	0089_PW350_210608	EP2106450	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		30/08/2021	0089_PW350_210830	EP2110017	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
WWTP	PW351	19/04/2018	0089_PW351_180419	209623	0.25	0.11	0.21	0.001	0.006	<0.002	0.027	0.040	0.10	0.003	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		30/01/2020	0089_PW351_200130	EP2001003	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		2/04/2020	0089_PW351_200402	EP2003474	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/07/2020	0089_PW351_200721	EP2007594	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		23/09/2020	0089_PW351_200923	EP2010220	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/12/2020	0089_PW351_201216	EP2014090	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	0089_PW351_210317	EP2102901	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		8/06/2021	0089_PW351_210608	EP2106450	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		30/08/2021	0089_PW351_210830	EP2110017	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
WWTP	PW352	19/04/2018	0089_PW352_180419	209623	0.13	0.043	0.034	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		30/01/2020	0089_PW352_200130	EP2001003	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		2/04/2020	0089_PW352_200402	EP2003476	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/07/2020	0089_PW352_200721	EP2007594	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		23/09/2020	0089_PW352_200923	EP2010220	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/12/2020	0089_PW352_201216	EP2014090	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	0089_PW352_210317	EP2102901	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	0089_PW352_210608	EP2106450	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	0089_PW352_210830	EP2110017	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.02**	**0.02**	**0.02**
Demolition ground	PW356	12/04/2018	0089_PW356_180412	209345	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		10/01/2020	0089_PW356_200110	EP2000252	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	0089_PW356_200330	EP2003308	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	0089_PW356_200720	EP2007544	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	0089_PW356_200923	EP2010220	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	0089_PW356_201214	EP2013973	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	0089_PW356_210316	EP2102836	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	0089_PW356_210608	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.12	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.12	0.12
		30/08/2021	0089_PW356_210830	EP2110021	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Demolition ground	PW357	12/04/2018	0089_PW357_180412	209345	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		10/01/2020	0089_PW357_200110	EP2000252	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	0089_PW357_200330	EP2003308	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	0089_PW357_200720	EP2007544	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	0089_PW357_200923	EP2010220	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	0089_PW357_201214	EP2013989	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	0089_PW357_210316	EP2102836	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	0089_PW357_210608	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	0089_PW357_210830	EP2110017	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Demolition ground	PW358	12/04/2018	0089_PW358_180412	209345	<0.001	<0.001	<0.001	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		10/01/2020	0089_PW358_200110	EP2000252	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	0089_PW358_200330	EP2003308	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	0089_PW358_200720	EP2007544	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	0089_PW358_200923	EP2010217	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	0089_PW358_201214	EP2013989	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	0089_PW358_210316	EP2102836	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	0089_PW358_210608	EP2106465	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	0089_PW358_210830	EP2110017	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		13/04/2018	0089_PW362_180413	209417	<0.001	<0.001	0.006	<0.001	0.009	<0.002	0.003	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	0089_PW362_200108	EP2000179	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
FTA	PW362	31/03/2020	0089_PW362_200331	EP2003364	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/07/2020	0089_PW362_200715	EP2007383	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02

Table 2 Porewater Analytical Results

					PFAS - Perfluoroalkyl Carboxylic Acids														PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PBA)	Perfluoropentanoic acid (PPeA)	Perfluorohexanoic acid (PHxA)	Perfluoroheptanoic acid (PHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PNA)	Perfluorodecanoic acid (PDA)	Perfluoroundecanoic acid (PUnDA)	Perfluorododecanoic acid (PDoDA)	Perfluorotridecanoic acid (PTrDA)	Perfluorotetradecanoic acid (PTeDA)	1:2 Fluorotelomer sulfonic acid (4:2 FTS)	2:2 Fluorotelomer sulfonic acid (6:2 FTS)	3:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFAS and PFOS	Sum of PFAS (WA DER list)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																	*0.07*		
PFAS NEMP 2020 Interim Marine 99%									0.00023						10																			
PFAS NEMP 2020 Recreational Water															**10**																	**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																														
WWTP	PW369	17/04/2018	0089_PW369_180417	209522	<0.001	<0.001	0.019	0.002	0.018	<0.002	0.01	<0.002	0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		9/01/2020	0089_PW369_200109	EP2000249	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		31/03/2020	0089_PW369_200331	EP2003374	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		15/07/2020	0089_PW369_200715	EP2007383	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		24/09/2020	0089_PW369_200924	EP2010271	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	0089_PW369_201215	EP2014053	<0.02	<0.02	0.09	<0.02	0.60	<0.02	<0.1	<0.02	0.05	0.02	0.08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.69	0.89	0.89
		16/03/2021	0089_PW369_210316	EP2102834	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		9/06/2021	0089_PW369_210609	EP2106517	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		1/09/2021	0089_PW369_210901	EP2110154	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
edge spoil and careening b	PW374	18/04/2018	0089_PW374_180418	209573	0.006	0.005	0.021	<0.001	0.007	<0.002	<0.002	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	0089_PW374_200108	EP2000186	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		30/03/2020	0089_PW374_200330	EP2003313	<0.02	<0.02	<0.02	<0.02	0.44	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.44	0.44	0.44
		21/07/2020	0089_PW374_200721	EP2007611	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/09/2020	0089_PW374_200921	EP2010085	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		14/12/2020	0089_PW374_201214	EP2013989	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/03/2021	0089_PW374_210315	EP2102758	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		10/06/2021	0089_PW374_210610	EP2106582	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.08	0.08	0.08
		1/09/2021	0089_PW374_210901	EP2110154	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
edge spoil and careening b	PW375	18/04/2018	0089_PW375_180418	209573	0.010	0.007	0.011	<0.001	0.003	<0.002	0.006	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	0089_PW375_200108	EP2000186	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		30/03/2020	0089_PW375_200330	EP2003313	<0.02	<0.02	<0.02	<0.02	0.09	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.09	0.09	0.09
		21/07/2020	0089_PW375_200721	EP2007611	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		21/09/2020	0089_PW375_200921	EP2010085	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		14/12/2020	0089_PW375_201214	EP2013989	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		15/03/2021	0089_PW375_210315	EP2102758	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		10/06/2021	0089_PW375_210610	EP2106582	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		1/09/2021	0089_PW375_210901	EP2110154	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05
edge spoil and careening b	PW378	17/04/2018	0089_PW378_180417	209522	0.016	0.013	0.020	<0.001	0.007	<0.002	0.024	0.01	0.081	0.005	0.005	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	0089_PW378_200108	EP2000186	<0.02	<0.02	<0.02	<0.02	0.12	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.12*	0.12	0.12
		30/03/2020	0089_PW378_200330	EP2003313	<0.02	<0.02	<0.02	<0.02	0.10	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.1*	0.10	0.10
		21/07/2020	0089_PW378_200721	EP2007611	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/09/2020	0089_PW378_200921	EP2010085	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	0089_PW378_201214	EP2013989	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		15/03/2021	0089_PW378_210315	EP2102758	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		10/06/2021	0089_PW378_210610	EP2106582	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05
		1/09/2021	0089_PW378_210901	EP2110154	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
WWTP	PW380	19/04/2018	0089_PW380_180419	209623	0.83	0.54	0.86	0.004	0.008	<0.002	0.11	0.16	0.68	0.016	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		30/01/2020	0089_PW380_200130	EP2001003	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		2/04/2020	0089_PW380_200402	EP2003476	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05
		21/07/2020	0089_PW380_200721	EP2007594	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05
		23/09/2020	0089_PW380_200923	EP2010217	<0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		16/12/2020	0089_PW380_201216	EP2014090	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	0089_PW380_210317	EP2102901	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	0089_PW380_210608	EP2106450	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	0089_PW380_210830	EP2110017	<0.02	<0.02	0.06	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.14*	0.14	0.14
WWTP	PW381	19/04/2018	0089_PW381_180419	209623	0.48	0.28	1.4	0.010	0.006	<0.002	0.11	0.21	0.57	0.012	0.004	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		30/01/2020	0089_PW381_200130	EP2001003	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		2/04/2020	0089_PW381_200402	EP2003474	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/07/2020	0089_PW381_200721	EP2007594	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05
		23/09/2020	0089_PW381_200923	EP2010217	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/12/2020	0089_PW381_201216	EP2014104	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	0089_PW381_210317	EP2102901	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	0089_PW381_210608	EP2106450	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		30/08/2021	0089_PW381_210830	EP2110017	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		19/04/2018	0089_PW379_180419	209623	0.88	0.61	3.6	0.079	0.040	<0.002	0.17	0.24	1.6	0.096	0.032	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
WWTP	PW401	30/01/2020	0089_PW401_200130	EP2001003	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		2/04/2020	0089_PW401_200402	EP2003474	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/07/2020	0089_PW401_200721	EP2007594	<0.02	<0.02	0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.07	0.07	0.07
		23/09/2020	0089_PW401_200923	EP2010230	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		16/12/2020	0089_PW401_201216	EP2014090	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	0089_PW401_210317	EP2102901	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	0089_PW401_210608	EP2106450	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		30/08/2021	0089_PW401_210830	EP2110017	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
HSF	PW405	14/01/2020	0089_PW405_200114	EP2000432	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/04/2020	0089_PW405_200401	EP2003417	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/07/2020	0089_PW405_200722	EP2007648	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/09/2020	0089_PW405_200921	EP2010085	<0.02	<0.02	<0.02	<0.02

					Inorganics													
					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (Filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
WWTP	PW304	17/04/2018	0089_PW304_180417	209522															
		8/01/2020	0089_PW304_200108	EP2000186	<1	302	<1	302	371	397	11,700	3.37	1,670	25,500	66	289	874	382	6,910
		1/04/2020	0089_PW304_200401	EP2003438	<1	434	<1	434	113	120	3,270	2.68	603	6,830	36	106	273	109	2,050
		20/07/2020	0089_PW304_200720	EP2007544	<1	443	<1	443	234	255	7,370	4.33	819	16,400	980	314	587	205	4,270
		22/09/2020	0089_PW304_200922	EP2010143	<1	347	<1	347	412	388	13,100	2.96	1,720	26,700	336	351	858	368	6,690
		15/12/2020	0089_PW304_201215	EP2014048	<1	209	<1	209	453	469	14,400	1.72	2,060	28,000	1,460	391	1,090	451	8,010
		15/03/2021	0089_PW304_210315	EP2102755	<1	352	<1	352	510	544	16,200	3.26	2,190	32,600	505	424	1,220	496	9,420
		10/06/2021	0089_PW304_210610	EP2106582	<1	657	<1	657	344	321	10,700	3.34	1,380	19,800	1,850	268	916	357	5,140
		1/09/2021	0089_PW304_210901	EP2110155	<1	193	<1	193	524	567	16,900	3.87	2,110			437	1,270	521	9,820
HSF	PW306	18/04/2018	0089_PW306_180418	209573															
		10/01/2020	0089_PW306_200110	EP2000293	<1	124	<1	124	589	598	18,800	0.74	2,720	41,400	640	416	1,310	508	10,500
		31/03/2020	0089_PW306_200331	EP2003366	<1	162	<1	162	596	756	18,900	11.9	2,850	41,100	387	532	1,750	796	13,000
		22/07/2020	0089_PW306_200722	EP2007648	<1	136	<1	136	587	644	18,700	4.60	2,740	42,200	510	434	1,380	501	11,400
		23/09/2020	0089_PW306_200923	EP2010220	<1	120	<1	120	618	678	19,700	4.60	2,880	36,900	55	489	1,550	656	11,700
		15/12/2020	0089_PW306_201215	EP2014048	<1	184	<1	184	631	677	20,100	3.51	2,910	42,100	318	517	1,520	677	11,700
		17/03/2021	0089_PW306_210317	EP2102892	<1	201	<1	201	649	609	20,600	3.13	3,050	44,700	97	465	1,340	576	10,600
		9/06/2021	0089_PW306_210609	EP2106519	<1	115	<1	115	583	673	18,700	7.17	2,550	39,500	44	472	1,510	634	11,700
		31/08/2021	0089_PW306_210831	EP2110072	<1	119	<1	119	554	627	17,700	6.20	2,510			452	1,410	563	10,900
HSF	PW307	30/04/2018	0089_PW307_180430	209959															
		10/01/2020	0089_PW307_200110	EP2000293	<1	113	<1	113	584	606	18,600	1.91	2,730	41,900	125	427	1,350	509	10,600
		31/03/2020	0089_PW307_200331	EP2003366	<1	123	<1	123	576	692	18,300	9.14	2,780	39,600	364	497	1,600	722	11,900
		22/07/2020	0089_PW307_200722	EP2007648	<1	121	<1	121	587	649	18,700	5.02	2,740	41,700	45	433	1,390	501	11,500
		23/09/2020	0089_PW307_200923	EP2010220	<1	122	<1	122	632	694	20,200	4.64	2,880	37,000	36	490	1,580	676	12,000
		15/12/2020	0089_PW307_201215	EP2014053	<1	123	<1	123	627	722	19,900	7.07	3,030	43,500	240	525	1,630	710	12,500
		17/03/2021	0089_PW307_210317	EP2102892	<1	118	<1	118	646	595	20,600	4.17	3,030	43,900	174	424	1,300	557	10,400
		9/06/2021	0089_PW307_210609	EP2106519	<1	114	<1	114	578	689	18,500	8.80	2,580	38,200	83	482	1,540	651	12,000
		31/08/2021	0089_PW307_210831	EP2110065	<1	117	<1	117	552	590	17,700	3.36	2,420			406	1,320	526	10,300
HSF	PW308	30/04/2018	0089_PW308_180430	209959															
		10/01/2020	0089_PW308_200110	EP2000293	<1	118	<1	118	587	593	18,700	0.51	2,730	42,000	321	413	1,300	500	10,400
		1/04/2020	0089_PW308_200401	EP2003417	<1	121	<1	121	640	731	20,500	6.60	2,870	38,200	453	507	1,680	758	12,600
		22/07/2020	0089_PW308_200722	EP2007648	<1	146	<1	146	590	645	18,800	4.42	2,750	42,000	3,750	439	1,390	505	11,400
		23/09/2020	0089_PW308_200923	EP2010217	<1	125	<1	125	607	694	19,300	6.68	2,880	36,800	237	492	1,580	674	12,000
		15/12/2020	0089_PW308_201215	EP2014053	<1	117	<1	117	614	703	19,400	6.83	3,070	44,000	185	507	1,580	684	12,200
		17/03/2021	0089_PW308_210317	EP2102892	<1	156	<1	156	642	590	20,400	4.19	3,040	43,400	531	420	1,300	556	10,300
		9/06/2021	0089_PW308_210609	EP2106519	<1	111	<1	111	576	662	18,400	6.98	2,620	38,500	54	468	1,490	625	11,500
		31/08/2021	0089_PW308_210831	EP2110072	<1	127	<1	127	563	685	18,000	9.77	2,520			486	1,540	625	11,900
HSF	PW314	18/04/2018	0089_PW314_180418	209573															
		10/01/2020	0089_PW314_200110	EP2000293	<1	126	<1	126	586	582	18,700	0.30	2,680	40,400	534	412	1,280	496	10,200
		31/03/2020	0089_PW314_200331	EP2003366	<1	165	<1	165	591	710	18,800	9.16	2,760	40,000	128	531	1,630	740	12,200
		22/07/2020	0089_PW314_200722	EP2007648	<1	134	<1	134	586	667	18,700	6.45	2,680	43,600	672	454	1,430	515	11,800
		23/09/2020	0089_PW314_200923	EP2010220	<1	179	<1	179	631	682	20,100	3.88	2,910	36,700	48	486	1,550	663	11,800
		15/12/2020	0089_PW314_201215	EP2014048	<1	341	<1	341	638	721	20,300	6.14	2,800	41,300	66	578	1,630	737	12,400
		17/03/2021	0089_PW314_210317	EP2102892	<1	131	<1	131	657	607	20,900	3.96	3,110	45,900	145	433	1,330	577	10,600
		9/06/2021	0089_PW314_210609	EP2106519	<1	109	<1	109	583	657	18,700	5.90	2,580	36,000	20	463	1,480	619	11,400
		31/08/2021	0089_PW314_210831	EP2110065	<1	117	<1	117	561	586	18,000	2.14	2,450			402	1,320	521	10,200
HSF	PW315	30/04/2018	0089_PW315_180430	209959															
		10/01/2020	0089_PW315_200110	EP2000293	<1	114	<1	114	608	611	19,300	0.24	2,940	41,000	640	424	1,350	513	10,700
		1/04/2020	0089_PW315_200401	EP2003417	<1	128	<1	128	642	753	20,600	7.94	2,810	38,500	270	523	1,720	775	13,000
		22/07/2020	0089_PW315_200722	EP2007648	<1	160	<1	160	584	646	18,600	5.08	2,690	41,200	129	452	1,390	530	11,400
		23/09/2020	0089_PW315_200923	EP2010217	<1	122	<1	122	616	705	19,600	6.73	2,920	35,500	72	502	1,600	688	12,200
		15/12/2020	0089_PW315_201215	EP2014048	<1	126	<1	126	644	706	20,600	4.55	2,910	42,800	67	516	1,590	718	12,200
		17/03/2021	0089_PW315_210317	EP2102892	<1	121	<1	121	633	578	20,200	4.55	2,940	43,200	251	412	1,270	542	10,100
		9/06/2021	0089_PW315_210609	EP2106519	<1	114	<1	114	577	652	18,500	6.08	2,560	38,100	210	463	1,480	616	11,300
		31/08/2021	0089_PW315_210831	EP2110072	<1	120	<1	120	552	662	17,700	8.99	2,440			471	1,490	600	11,500
HSF	PW316	30/04/2018	0089_PW316_180430	209959															
		10/01/2020	0089_PW316_200110	EP2000293	<1	126	<1	126	607	599	19,300	0.62	2,870	42,300	226	418	1,320	509	10,500
		1/04/2020	0089_PW316_200401	EP2003417	<1	116	<1	116	595	676	19,000	6.39	2,730	37,400	584	490	1,540	634	11,700
		22/07/2020	0089_PW316_200722	EP2007648	<1	132	<1	132	585	661	18,600	6.08	2,780	35,000	458	443	1,420	513	11,700
		23/09/2020	0089_PW316_200923	EP2010217	<1	132	<1	132	618	710	19,700	6.93	2,880	37,500	560	505	1,610	692	12,300
		15/12/2020	0089_PW316_201215	EP2014053	<1	144	<1	144	636	723	20,200	6.37	3,050	43,000	1,730	527	1,630	725	12,500
		17/03/2021	0089_PW316_210317	EP2102892	<1	131	<1	131	687	636	21,900	3.86	3,220	42,800	419	451	1,400	615	11,100
		9/06/2021	0089_PW316_210609	EP2106519	<1	118	<1	118	575	673	18,400	7.84	2,580	38,500	376	474	1,510	631	11,700
		31/08/2021	0089_PW316_210831	EP2110065	<1	142	<1	142	550	587	17,600	3.27	2,430			410	1,330	529	10,200
Demolition ground	PW329	12/04/2018	0089_PW329_180412	209345															
		10/01/2020	0089_PW329_200110	EP2000252	<1	223	<1	223	837	931	27,000	5.35	3,400	49,100	140	664	2,100	985	16,100
		30/03/2020	0089_PW329_200330	EP2003308	<1	462	<1	462	661	802	20,800	9.68	3,120	44,700	554	725	1,870	817	13,600
		20/07/2020	0089_PW329_200720	EP2007544	<1	122	<1	122	565	690	18,000	9.94	2,640	40,900	144	477	1,510	607	12,100
		23/09/2020	0089_PW329_200923	EP2010217	<1	200	<1	200	626	676	19,900	3.85	2,910	37,500	9,260	484	1,530	666	11,700
		14/12/2020	0089_PW329_201214	EP2013973	<1	134	<1	134	610	689	19,400	6.10	2,870	37,500	146	472	1,550	616	12,000
		16/03/2021	0089_PW329_210316	EP2102836	<1	186	<1	186	658	725	21,000	4.79	3,000	43,300	85	517	1,620	689	12,600
		8/06/2021	0089_PW329_210608	EP2106465	<1	146	<1	146	546	634	17,300	7.45	2,640	40,900	522	466	1,420	595	11,000
		30/08/2021	0089_PW329_210830	EP2110017	<1	147	<1	147	556	601	17,800	3.89	2,460			450	1,350	600	10,400
Demolition ground	PW330	12/04/2018	0089_PW330_180412	209345															
		10/01/2020	0089_PW330_200110	EP2000252	<1	322	<1	322	890	945	28,800	2.98	3,430	48,700	72	696	2,140	979	16,300
		30/03/2020	0089_PW330_200330	EP2003308	<1	257	<1	257	629	756	19,900	9.17	3,010	43,300	83	623	1,760	747	12,900
		20/07/2020	0089_PW330_200720	EP2007544	<1	122	<1	122	586	672	18,700	6.88	2,690	42,100	275	465	1,470	592	11,800
		22/09/2020	0089_PW330_200922	EP2010151	<1	160	<1	160	617	687	19,700	5.40	2,790	40,500	274	528	1,540	652	11,900
		14/12/2020	0089_PW330_201214	EP2013989	<1	128	<1	128	626	731	19,900	7.77	2,980	40,300	72	516	1,640	715	12,700
		16/03/2021	0089_PW330_210316	EP2102836	<1	134	<1	134	661	713	21,200	3.76	2,920	43,700	148	511	1,590	685	12,400
		8/06/2021	0089_PW330_210608	EP2106465	<1	138	<1	138	570	628	18,200	4.92	2,570	39,600	57	465	1,410	594	10,900
		30/08/2021	0089_PW330_210830	EP2110017	<1	148	<1	148	553	595	17,600	3.64	2,570			443	1,330	591	10,300
Demolition ground	PW331	12/04/2018	0089_PW331_180412	209345															
		10/01/2020	0089_PW331_200110	EP2000252	<1	234	<1	234	673	789	21,400	7.91	3,120	43,100	222	576	1,800	800	13,600
		30/03/2020	0089_PW331_200330	EP2003308	<1	241	<1	241	656	764	20,900	7.63	2,940	44,600	295	613	1,800	770	13,000
		20/07/2020	0089_PW331_200720	EP2007544	<1	130	<1	130	568	655	18,200	7.11	2,520	41,900	330	454	1,430	582	11,500
		23/09/2020	0089_PW331_200923	EP2010220	<1	210	<1	210	639	668	20,400	2.15	2,870	37,600	99	489	1,530	664	11,500
		14/12/2020	0089_PW331_201214	EP2013973	<1	142	<1	142	606	712	19,300	7.99	2,840	34,900	47	509	1,620	703	12,300
		16/03/2021	0089_PW331_210316	EP2102836	<1	172	<1	172	646	736	20,600	6.46	2,970	41,600	224	538	1,630	700	12,800
		8/06/2021	0089_PW331_210608	EP2106465	<1	110	<1	110	591	622	18,900	2.59	2,660	43,000	102	446	1,400	584	10,800
		30/08/2021	0089_PW331_210830	EP2110017	<1	125	<1	125	545	605	17,400	5.26	2,470			443	1,350	599	10,500
FTA	PW335	13/04/2018	0089_PW335_180413	209417															
		9/01/2020	0089_PW335_200109	EP2000249	<1	142	<1	142	665	749	21,300	5.96	2,930	42,100	22	492	1,690	604	13,100
		30/03/2020	0089_PW335_200330	EP2003333	<1	271	<1	271	561	664	17,800	8.42	2,560	38,600	195	514	1,580	656	11,300
		15/07/2020	0089_PW335_200715	EP2007383	<1	195	<1	195	575	681	18,300	8.41	2,640	41,700	97	530	1,470	611	11,900
		22/09/2020	0089_PW335_200922	EP2010151	<1	136	<1	136	618	691	19,700	5.59	2,840	41,400	123	495	1,550	645	12,000
		14/12/2020	0089_PW335_201214	EP2013985	<1	192	<1	192	621	704	19,800	6.19	2,840	39,600	125	511	1,580	679	12,200
		15/03/2021	0089_PW335_210315	EP2102752	<1	145	<1	145	660	727	21,200	4.77	2,860	42,500	1,680	508	1,600	674	12,700
		8/06/2021	0089_PW335_210608	EP2106465	<1	125	<1	125	581	634	18,600	4.34	2,600	43,000	119	460	1,430	586	11,000
		30/08/2021	0089_PW335_210830	EP2110021	<1	114	<1	114	552	562	17,700	0.96	2,400			409	1,260	564	9,740
FTA	PW340	13/04/2018	0089_PW340_180413	209417															
		9/01/2020	0089_PW340_200109	EP2000249	<1	143	<1	143	645	732	20,600	6.28	2,950	42,400	98	486	1,650	588	12,800
		30/03/2020	0089_PW340_200330	EP2003333	<1	282	<1	282	495	588	15,600	8.61	2,350	32,700	105	483	1,380	591	10,000
		15/07/2020	0089_PW340_200715	EP2007383	<1	135	<1	135	578	657	18,400	6.36	2,710	42,800	438	467	1,450	543	11,500
		22/09/2020	0089_PW340_200922	EP2010151	<1	130	<1	130	622	722	19,900	7.43	2,780	40,800	88	520	1,630	697	12,500
		14/12/2020	0089_PW340_201214	EP2013988	<1	143	<1	143	642	723	20,400	5.93	3,080	39,500	135	526	1,640	721	12,500
		15/03/2021	0089_PW340_210315	EP2102752	<1	133	<1	133	685	811	22,000	8.41	2,980	46,200	541	556	1,780	754	14,200
		8/06/2021	0089_PW340_210608	EP2106450	<1	111	<1	111	543	648	17,200	8.80	2,670	38,900	92	449	1,440	598	11,300
		30/08/2021	0089_PW340_210830	EP2110021	<1	124	<1	124	527	557	16,800	2.74	2,450			406	1,250	558	9,650
FTA	PW341	13/04/2018	0089_PW341_180413	209417															
		8/01/2020	0089_PW341_200108	EP2000179	<1	127	<1	127	658	657	20,800	0.12	3,310	42,800	129	476	1,440	552	11,500
		31/03/2020	0089_PW341_200331	EP2003364	<1	375	<1	375	608	698	19,200	6.87	2,850	43,100	2,470	577	1,620	720	11,900
		15/07/2020	0089_PW341_200715	EP2007383	<1	187	<1	187	578	690	18,400	8.90	2,630	40,400	208	531	1,480	619	12,100
		22/09/2020	0089_PW341_200922	EP2010151	<1	130	<1	130	614	729	19,600	8.54	2,810	38,900	52	510	1,620	685	12,700
		14/12/2020	0089_PW341_201214	EP2013988	<1	141	<1	141	637	750	20,200	8.17	3,080	32,700	193	545	1,680	750	13,000
		15/03/2021	0089_PW341_210315	EP2102752	<1	116	<1	116	662	744	21,200	5.81	2,960	44,000	253	513	1,640	689	13,000
		8/06/2021	0089_PW341_210608	EP2106450	<1	123	<1	123	562	660	17,800	7.97	2,780	39,000	89	463	1,470	607	11,500
		30/08/2021	0089_PW341_210830	EP2110021	<1	126	<1	126	534	553	17,100	1.81	2,340			406	1,240	556	9,580
WWTP	PW345	13/04/2018	0089_PW345_180413	209417															
		9/01/2020	0089_PW345_200109	EP2000249	<1	154	<1	154	667	849	21,300	12.0	3,050	45,300	66	621	1,900	866	14,700
		31/03/2020	0089_PW345_200331	EP2003374	<1	404	<1	404	200	208	6,170	1.99	870	12,500	145	155	453	213	3,630
		24/09/2020	0089_PW345_200924	EP2010271	<1	438	<1	438	649	724	20,600	5.42	2,850	42,200	414	572	1,620	705	12,500
		15/12/2020	0089_PW345_201215	EP2014053	<1	425	<1	425	750	903	23,600	9.25	3,660	53,600	2,950	721	2,000	948	15,600
		16/03/2021	0089_PW345_210316	EP2102834	<1	277	<1	277	638	662	20,300	1.86	2,890	43,100	449	516	1,470	610	11,500
		9/06/2021	0089_PW345_210609	EP2106517	<1	145	<1	145	569	656	18,200	7.13	2,540	39,000	1,720	470	1,480	604	11,400
		1/09/2021	0089_PW345_210901	EP2110154	<1	490	<1	490	448	474	14,200	2.75	1,820			371	1,080	458	8,150

Table 2 Porewater Analytical Results

					Inorganics															
					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) (as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
		17/04/2018	**0089_PW346_180417**	**209522**															
		8/01/2020	**0089_PW346_200108**	**EP2000186**	<1	616	<1	616	209	223	6,390	3.28	803	13,400	1,750	202	493	227	3,840
		1/04/2020	**0089_PW346_200401**	**EP2003438**	<1	883	<1	883	626	707	19,700	6.12	2,520	44,600	177	628	1,640	748	12,000
Accomodation	**PW346**	**15/07/2020**	**0089_PW346_200715**	**EP2007386**	<1	160	<1	160	586	678	18,700	7.23	2,670	39,800	2,570	491	1,460	604	11,900
		22/09/2020	**0089_PW346_200922**	**EP2010143**	<1	337	<1	337	333	303	10,600	4.62	1,300	21,200	69	276	693	285	5,180
		15/12/2020	**0089_PW346_201215**	**EP2014044**	<1	153	<1	153	106	108	3,230	0.64	587	6,410	55	90	269	94	1,810
		17/03/2021	**0089_PW346_210317**	**EP2102901**	<1	465	<1	465	609	736	19,300	9.40	2,660	36,700	856	634	1,610	742	12,700
		10/06/2021	**0089_PW346_210610**	**EP2106580**	<1	271	<1	271	554	600	17,600	4.06	2,490	38,000	923	469	1,380	608	10,300
		30/08/2021	**0089_PW346_210830**	**EP2110017**	<1	142	<1	142	529	571	16,900	3.87	2,370			429	1,290	569	9,870
		19/04/2018	**0089_PW350_180419**	**209623**															
		30/01/2020	**0089_PW350_200130**	**EP2001003**	<1	118	<1	118	630	675	20,200	3.43	2,800	41,000	57	469	1,510	560	11,800
		2/04/2020	**0089_PW350_200402**	**EP2003476**	<1	118	<1	118	605	704	19,300	7.51	2,810	41,900	113	509	1,610	758	12,100
WWTP	**PW350**	**21/07/2020**	**0089_PW350_200721**	**EP2007594**	<1	126	<1	126	564	677	17,900	9.09	2,720	42,200	172	478	1,500	639	11,800
		23/09/2020	**0089_PW350_200923**	**EP2010220**	<1	120	<1	120	635	705	20,300	5.24	2,880	36,400	74	508	1,600	686	12,200
		16/12/2020	**0089_PW350_201216**	**EP2014090**	<1	118	<1	118	644	691	20,600	3.52	2,900	36,700	99	509	1,590	660	11,900
		17/03/2021	**0089_PW350_210317**	**EP2102901**	<1	161	<1	161	680	733	21,700	3.74	3,110	43,400	241	527	1,640	750	12,700
		8/06/2021	**0089_PW350_210608**	**EP2106450**	<1	114	<1	114	567	670	18,000	8.31	2,730	42,700	198	462	1,480	622	11,700
		30/08/2021	**0089_PW350_210830**	**EP2110017**	<1	119	<1	119	559	595	17,800	3.16	2,600			431	1,340	595	10,300
		19/04/2018	**0089_PW351_180419**	**209623**															
		30/01/2020	**0089_PW351_200130**	**EP2001003**	<1	172	<1	172	623	667	19,900	3.38	2,810	41,600	75	462	1,470	546	11,700
		2/04/2020	**0089_PW351_200402**	**EP2003474**	<1	118	<1	118	589	711	18,700	9.37	2,850	42,200	287	517	1,640	765	12,200
WWTP	**PW351**	**21/07/2020**	**0089_PW351_200721**	**EP2007594**	<1	125	<1	125	576	684	18,300	8.56	2,760	41,700	39	481	1,530	648	11,900
		23/09/2020	**0089_PW351_200923**	**EP2010220**	<1	119	<1	119	630	707	20,200	5.72	2,800	37,000	57	509	1,620	690	12,200
		16/12/2020	**0089_PW351_201216**	**EP2014090**	<1	144	<1	144	629	695	20,100	4.95	2,860	40,100	155	506	1,590	659	12,000
		17/03/2021	**0089_PW351_210317**	**EP2102901**	<1	141	<1	141	660	708	21,100	3.49	3,000	41,900	122	507	1,580	702	12,300
		8/06/2021	**0089_PW351_210608**	**EP2106450**	<1	105	<1	105	568	660	18,000	7.48	2,790	42,200	61	459	1,470	613	11,500
		30/08/2021	**0089_PW351_210830**	**EP2110017**	<1	114	<1	114	550	599	17,600	4.23	2,490			429	1,340	595	10,400
		19/04/2018	**0089_PW352_180419**	**209623**															
		30/01/2020	**0089_PW352_200130**	**EP2001003**	<1	120	<1	120	646	663	20,800	1.30	2,720	42,500	104	465	1,470	551	11,600
		2/04/2020	**0089_PW352_200402**	**EP2003476**	<1	178	<1	178	612	710	19,500	7.42	2,800	40,300	119	514	1,630	762	12,200
WWTP	**PW352**	**21/07/2020**	**0089_PW352_200721**	**EP2007594**	<1	126	<1	126	567	679	18,000	8.97	2,720	41,000	194	478	1,520	641	11,800
		23/09/2020	**0089_PW352_200923**	**EP2010220**	<1	124	<1	124	630	672	20,200	3.22	2,770	37,200	36	482	1,540	648	11,600
		16/12/2020	**0089_PW352_201216**	**EP2014090**	<1	114	<1	114	628	679	20,100	3.84	2,840	39,400	107	499	1,560	643	11,700
		17/03/2021	**0089_PW352_210317**	**EP2102901**	<1	126	<1	126	656	691	21,000	2.55	2,960	41,200	104	493	1,540	689	12,000
		8/06/2021	**0089_PW352_210608**	**EP2106450**	<1	116	<1	116	568	676	18,000	8.70	2,770	41,400	26	469	1,500	620	11,800
		30/08/2021	**0089_PW352_210830**	**EP2110017**	<1	121	<1	121	556	599	17,800	3.71	2,500			433	1,340	594	10,400
		12/04/2018	**0089_PW356_180412**	**209345**															
		10/01/2020	**0089_PW356_200110**	**EP2000252**	<1	260	<1	260	671	803	21,400	8.97	2,980	43,200	209	575	1,810	816	13,900
		30/03/2020	**0089_PW356_200330**	**EP2003308**	<1	422	<1	422	711	929	22,600	13.3	3,140	51,900	130	696	2,130	906	16,000
		20/07/2020	**0089_PW356_200720**	**EP2007544**	<1	121	<1	121	571	685	18,200	9.03	2,670	39,800	154	477	1,500	612	12,000
Demolition ground	**PW356**	**23/09/2020**	**0089_PW356_200923**	**EP2010220**	<1	266	<1	266	625	712	19,900	6.48	2,810	36,800	180	523	1,610	709	12,300
		14/12/2020	**0089_PW356_201214**	**EP2013973**	<1	246	<1	246	596	694	18,900	7.59	2,780	37,100	99	504	1,570	684	12,000
		16/03/2021	**0089_PW356_210316**	**EP2102836**	<1	317	<1	317	652	768	20,700	8.16	2,960	43,400	1,410	584	1,720	725	13,300
		8/06/2021	**0089_PW356_210608**	**EP2106465**	<1	110	<1	110	590	645	18,900	4.46	2,620	43,400	178	460	1,450	607	11,200
		30/08/2021	**0089_PW356_210830**	**EP2110021**	<1	201	<1	201	559	584	17,800	2.20	2,540			443	1,310	582	10,100
		12/04/2018	**0089_PW357_180412**	**209345**															
		10/01/2020	**0089_PW357_200110**	**EP2000252**	<1	173	<1	173	717	896	22,900	11.1	3,240	47,700	50	634	2,020	924	15,500
		30/03/2020	**0089_PW357_200330**	**EP2003308**	<1	173	<1	173	634	771	20,200	9.73	2,920	42,800	276	587	1,800	752	13,200
		20/07/2020	**0089_PW357_200720**	**EP2007544**	<1	189	<1	189	578	690	18,400	8.82	2,670	42,000	208	480	1,510	615	12,100
Demolition ground	**PW357**	**23/09/2020**	**0089_PW357_200923**	**EP2010220**	<1	166	<1	166	630	671	20,100	3.18	2,860	42,300	100	481	1,530	656	11,600
		14/12/2020	**0089_PW357_201214**	**EP2013989**	<1	123	<1	123	625	710	19,900	6.39	2,930	40,200	166	504	1,610	681	12,300
		16/03/2021	**0089_PW357_210316**	**EP2102836**	<1	142	<1	142	658	707	21,100	3.60	2,890	42,300	194	504	1,580	671	12,300
		8/06/2021	**0089_PW357_210608**	**EP2106465**	<1	142	<1	142	590	657	18,900	5.37	2,600	44,200	87	490	1,470	616	11,400
		30/08/2021	**0089_PW357_210830**	**EP2110017**	<1	130	<1	130	536	578	17,100	3.74	2,460			425	1,300	572	10,000
		12/04/2018	**0089_PW358_180412**	**209345**															
		10/01/2020	**0089_PW358_200110**	**EP2000252**	<1	176	<1	176	710	847	22,700	8.82	3,170	47,200	88	579	1,900	879	14,700
		30/03/2020	**0089_PW358_200330**	**EP2003308**	<1	316	<1	316	665	879	21,000	13.8	3,200	48,200	200	771	1,970	857	15,100
		20/07/2020	**0089_PW358_200720**	**EP2007544**	<1	121	<1	121	555	641	17,700	7.20	2,550	40,900	596	448	1,420	568	11,200
Demolition ground	**PW358**	**23/09/2020**	**0089_PW358_200923**	**EP2010217**	<1	175	<1	175	623	721	19,800	7.32	2,920	37,600	103,000	508	1,630	706	12,500
		14/12/2020	**0089_PW358_201214**	**EP2013989**	<1	128	<1	128	657	783	20,900	8.79	3,100	38,000	93	548	1,760	762	13,600
		16/03/2021	**0089_PW358_210316**	**EP2102836**	<1	131	<1	131	663	689	21,200	1.92	2,990	43,500	106	489	1,530	646	12,000
		8/06/2021	**0089_PW358_210608**	**EP2106465**	<1	125	<1	125	595	682	19,000	6.86	2,700	44,300	38	492	1,550	660	11,800
		30/08/2021	**0089_PW358_210830**	**EP2110017**	<1	131	<1	131	537	618	17,100	7.01	2,480			457	1,380	614	10,700
		13/04/2018	**0089_PW362_180413**	**209417**															
		8/01/2020	**0089_PW362_200108**	**EP2000179**	<1	232	<1	232	711	776	22,200	4.39	3,860	45,800	289	556	1,710	645	13,600
		31/03/2020	**0089_PW362_200331**	**EP2003364**	<1	215	<1	215	555	671	17,500	9.47	2,750	37,400	719	509	1,550	710	11,500
		15/07/2020	**0089_PW362_200715**	**EP2007383**	<1	130	<1	130	596	717	19,100	9.20	2,630	42,100	653	510	1,540	650	12,600
FTA	**PW362**	**22/09/2020**	**0089_PW362_200922**	**EP2010151**	<1	132	<1	132	619	694	19,800	5.73	2,780	41,000	76	501	1,580	676	12,000
		14/12/2020	**0089_PW362_201214**	**EP2013988**	<1	132	<1	132	630	665	20,000	2.71	3,040	38,000	273	499	1,510	618	11,500
		15/03/2021	**0089_PW362_210315**	**EP2102758**	<1	118	<1	118	614	749	19,500	9.88	2,960	43,800	406	512	1,650	688	13,100
		8/06/2021	**0089_PW362_210608**	**EP2106450**	<1	128	<1	128	558	642	17,700	6.98	2,720	37,700	118	448	1,430	590	11,200
		30/08/2021	**0089_PW362_210830**	**EP2110021**	<1	116	<1	116	535	584	17,100	4.38	2,420			425	1,320	586	10,100
		13/04/2018	**0089_PW363_180413**	**209417**															
		8/01/2020	**0089_PW363_200108**	**EP2000179**	<1	435	<1	435	802	871	25,600	4.11	3,420	54,100	132	617	1,950	717	15,200
		31/03/2020	**0089_PW363_200331**	**EP2003364**	<1	310	<1	310	384	446	12,000	7.47	1,890	23,800	171	366	1,030	469	7,610
		15/07/2020	**0089_PW363_200715**	**EP2007383**	<1	222	<1	222	572	532	18,300	3.61	2,480	39,500	444	414	1,160	461	9,300
FTA	**PW363**	**22/09/2020**	**0089_PW363_200922**	**EP2010151**	<1	214	<1	214	699	732	22,600	2.33	2,760	40,400	174	530	1,650	700	12,700
		14/12/2020	**0089_PW363_201214**	**EP2013988**	<1	131	<1	131	633	707	20,100	5.52	3,030	37,800	105	517	1,610	692	12,200
		15/03/2021	**0089_PW363_210315**	**EP2102752**	<1	122	<1	122	662	747	21,200	6.07	2,940	43,400	234	512	1,630	690	13,100
		8/06/2021	**0089_PW363_210608**	**EP2106450**	<1	120	<1	120	563	654	17,800	7.51	2,810	39,100	60	461	1,460	602	11,400
		30/08/2021	**0089_PW363_210830**	**EP2110021**	<1	127	<1	127	542	570	17,300	2.52	2,470			415	1,280	573	9,870
		13/04/2018	**0089_PW364_180413**	**209417**															
		9/01/2020	**0089_PW364_200109**	**EP2000249**	<1	175	<1	175	672	754	21,600	5.76	2,820	42,600	41	495	1,690	612	13,200
		30/03/2020	**0089_PW364_200330**	**EP2003333**	<1	289	<1	289	500	590	15,800	8.30	2,320	33,000	408	482	1,410	594	10,000
		15/07/2020	**0089_PW364_200715**	**EP2007383**	<1	128	<1	128	577	657	18,400	6.46	2,670	43,300	216	469	1,450	543	11,500
FTA	**PW364**	**22/09/2020**	**0089_PW364_200922**	**EP2010151**	<1	128	<1	128	623	725	19,900	7.55	2,840	41,100	81	517	1,620	688	12,600
		14/12/2020	**0089_PW364_201214**	**EP2013985**	<1	150	<1	150	617	728	19,600	8.23	2,940	39,000	238	519	1,650	704	12,600
		15/03/2021	**0089_PW364_210315**	**EP2102755**	<1	120	<1	120	669	735	21,500	4.69	2,880	43,900	76	510	1,640	685	12,800
		8/06/2021	**0089_PW364_210608**	**EP2106465**	<1	116	<1	116	585	639	18,700	4.41	2,670	41,800	391	461	1,440	592	11,100
		30/08/2021	**0089_PW364_210830**	**EP2110021**	<1	118	<1	118	542	566	17,400	2.18	2,360			408	1,270	567	9,820
		17/04/2018	**0089_PW367_180417**	**209522**															
		8/01/2020	**0089_PW367_200108**	**EP2000186**	<1	1,890	<1	1,890	495	541	15,300	4.48	1,220	33,100	817	433	1,220	486	9,350
		31/03/2020	**0089_PW367_200331**	**EP2003374**	<1	395	<1	395	322	336	10,200	2.06	1,270	19,200	214	297	851	297	5,590
		15/07/2020	**0089_PW367_200715**	**EP2007383**	<1	129	<1	129	595	690	19,000	7.40	2,710	40,700	160	503	1,490	624	12,100
		22/09/2020	**0089_PW367_200922**	**EP2010143**	<1	147	<1	147	640	668	20,500	2.16	2,820	41,800	215	462	1,460	628	11,700
WWTP	**PW367**	**15/12/2020**	**0089_PW367_201215**	**EP2014048**	<1	174	<1	174	630	704	20,100	5.49	2,880	40,800	370	503	1,580	700	12,200
		15/03/2021	**0089_PW367_210315**	**EP2102758**	<1	296	<1	296	658	679	21,000	1.52	2,890	44,300	479	476	1,350	688	12,100
		9/06/2021	**0089_PW367_210609**	**EP2106517**	<1	176	<1	176	574	675	18,300	8.12	2,600	33,000	2,120	488	1,530	630	11,700
		1/09/2021	**0089_PW367_210901**	**EP2110155**	<1	193	<1	193	539	590	17,300	4.58	2,250			482	1,320	552	10,200
		17/04/2018	**0089_PW368_180417**	**209522**															
		8/01/2020	**0089_PW368_200108**	**EP2000186**	<1	256	<1	256	445	490	14,200	4.74	1,900	31,800	106	351	1,130	468	8,440
		1/04/2020	**0089_PW368_200401**	**EP2003438**	<1	181	<1	181	480	529	15,200	4.81	2,300	34,600	20	389	1,230	568	9,050
		20/07/2020	**0089_PW368_200720**	**EP2007544**	<1	216	<1	216	502	591	16,000	8.17	2,220	34,500	141	460	1,300	518	10,300
		22/09/2020	**0089_PW368_200922**	**EP2010143**	<1	208	<1	208	428	414	13,700	1.68	1,780	26,700	382	317	925	397	7,160
		15/12/2020	**0089_PW368_201215**	**EP2014048**	<1	258	<1	258	564	587	17,900	1.98	2,580	36,700	153	446	1,340	578	10,100
		15/03/2021	**0089_PW368_210315**	**EP2102758**	<1	102	<1	102	592	707	18,800	8.83	2,860	42,600	79	481	1,540	645	12,400
		10/06/2021	**0089_PW368_210610**	**EP2106582**	<1	219	<1	219	506	563	16,200	5.35	2,150	35,200	172	446	1,310	530	9,650
WWTP	**PW368**	**1/09/2021**	**0089_PW368_210901**	**EP2110155**	<1	123	<1	123	552	646	17,800	7.77	2,300			458	1,460	599	11,200

Table 2 Porewater Analytical Results

					Inorganics															
					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) (as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4- (colorimetric) (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
WWTP	PW369	**17/04/2018**	**0089_PW369_180417**	**209522**															
		9/01/2020	**0089_PW369_200109**	**EP2000249**	<1	136	<1	136	693	866	22,200	11.0	3,100	46,300	154	604	1,940	920	15,000
		31/03/2020	**0089_PW369_200331**	**EP2003374**	<1	469	<1	469	186	177	5,680	2.56	801	11,400	94	166	444	167	2,940
		15/07/2020	**0089_PW369_200715**	**EP2007383**	<1	128	<1	128	598	728	19,100	9.80	2,710	40,400	229	518	1,560	650	12,800
		24/09/2020	**0089_PW369_200924**	**EP2010271**	<1	199	<1	199	636	692	20,300	4.28	2,840	40,500	846	519	1,550	670	12,000
		15/12/2020	**0089_PW369_201215**	**EP2014053**	<1	189	<1	189	625	701	19,800	5.74	3,020	43,900	2,320	528	1,590	698	12,100
		16/03/2021	**0089_PW369_210316**	**EP2102834**	<1	179	<1	179	651	712	20,800	4.50	2,920	44,700	353	524	1,580	662	12,400
		9/06/2021	**0089_PW369_210609**	**EP2106517**	<1	130	<1	130	581	692	18,600	8.70	2,600	40,200	112	491	1,570	645	12,000
		1/09/2021	**0089_PW369_210901**	**EP2110154**	<1	317	<1	317	255	260	7,940	1.06	1,170			208	594	269	4,460
edge spoil and careening b	PW374	**18/04/2018**	**0089_PW374_180418**	**209573**															
		8/01/2020	**0089_PW374_200108**	**EP2000186**	<1	156	<1	156	616	708	19,700	6.93	2,750	44,400	104	459	1,590	574	12,400
		30/03/2020	**0089_PW374_200330**	**EP2003313**	<1	330	<1	330	282	288	8,840	1.13	1,250	16,400	122	204	676	286	4,950
		21/07/2020	**0089_PW374_200721**	**EP2007611**	<1	126	<1	126	569	673	18,100	8.39	2,690	41,500	12	479	1,510	636	11,700
		21/09/2020	**0089_PW374_200921**	**EP2010085**	<1	125	<1	125	552	635	17,400	7.03	2,800	38,400	142	422	1,460	602	11,000
		14/12/2020	**0089_PW374_201214**	**EP2013989**	<1	126	<1	126	674	772	21,500	6.78	3,140	42,000	180	546	1,740	749	13,400
		15/03/2021	**0089_PW374_210315**	**EP2102758**	<1	119	<1	119	657	687	21,100	2.26	2,860	43,300	90	452	1,360	702	12,300
		10/06/2021	**0089_PW374_210610**	**EP2106582**	<1	120	<1	120	578	662	18,500	6.78	2,600	42,100	136	462	1,500	618	11,500
		1/09/2021	**0089_PW374_210901**	**EP2110154**	<1	118	<1	118	548	620	17,700	6.17	2,240			436	1,390	566	10,800
edge spoil and careening b	PW375	**18/04/2018**	**0089_PW375_180418**	**209573**															
		8/01/2020	**0089_PW375_200108**	**EP2000186**	<1	231	<1	231	372	444	11,800	8.74	1,670	27,100	218	333	990	481	7,660
		30/03/2020	**0089_PW375_200330**	**EP2003313**	<1	139	<1	139	586	684	18,700	7.73	2,670	35,500	174	512	1,610	667	11,700
		21/07/2020	**0089_PW375_200721**	**EP2007611**	<1	124	<1	124	572	646	18,300	6.05	2,570	41,300	96	512	1,410	670	11,200
		21/09/2020	**0089_PW375_200921**	**EP2010085**	<1	123	<1	123	561	646	17,700	6.98	2,860	38,800	149	424	1,480	604	11,200
		14/12/2020	**0089_PW375_201214**	**EP2013989**	<1	120	<1	120	642	733	20,400	6.64	3,070	41,200	426	520	1,660	707	12,700
		15/03/2021	**0089_PW375_210315**	**EP2102758**	<1	116	<1	116	642	672	20,600	2.28	2,800	42,700	66	435	1,340	692	12,000
		10/06/2021	**0089_PW375_210610**	**EP2106582**	<1	118	<1	118	581	691	18,600	8.63	2,610	42,800	64	485	1,560	649	12,000
		1/09/2021	**0089_PW375_210901**	**EP2110154**	<1	119	<1	119	547	656	17,500	9.10	2,430			460	1,480	603	11,400
edge spoil and careening b	PW378	**17/04/2018**	**0089_PW378_180417**	**209522**															
		8/01/2020	**0089_PW378_200108**	**EP2000186**	<1	125	<1	125	603	685	19,400	6.35	2,570	45,500	273	446	1,540	552	12,000
		30/03/2020	**0089_PW378_200330**	**EP2003313**	<1	223	<1	223	273	292	8,660	3.29	1,180	16,100	127	235	701	280	4,950
		21/07/2020	**0089_PW378_200721**	**EP2007611**	<1	113	<1	113	572	656	18,200	6.79	2,720	41,500	41	511	1,420	682	11,400
		21/09/2020	**0089_PW378_200921**	**EP2010085**	<1	118	<1	118	554	679	17,500	10.1	2,810	39,500	76	479	1,520	656	11,800
		14/12/2020	**0089_PW378_201214**	**EP2013989**	<1	112	<1	112	626	726	19,900	7.41	3,000	39,700	527	509	1,640	696	12,600
		15/03/2021	**0089_PW378_210315**	**EP2102758**	<1	102	<1	102	639	661	20,500	1.68	2,810	43,500	134	432	1,320	675	11,800
		10/06/2021	**0089_PW378_210610**	**EP2106582**	<1	131	<1	131	581	669	18,600	7.06	2,580	37,600	60	470	1,520	630	11,600
		1/09/2021	**0089_PW378_210901**	**EP2110154**	<1	119	<1	119	557	650	18,000	7.69	2,240			453	1,460	598	11,300
WWTP	PW380	**19/04/2018**	**0089_PW380_180419**	**209623**															
		30/01/2020	**0089_PW380_200130**	**EP2001003**	<1	125	<1	125	629	680	20,100	3.93	2,840	41,700	99	476	1,510	562	11,900
		2/04/2020	**0089_PW380_200402**	**EP2003476**	<1	118	<1	118	608	721	19,400	8.52	2,810	41,700	136	528	1,650	778	12,400
		21/07/2020	**0089_PW380_200721**	**EP2007594**	<1	124	<1	124	576	678	18,300	8.05	2,780	40,400	46	475	1,510	638	11,800
		23/09/2020	**0089_PW380_200923**	**EP2010217**	<1	122	<1	122	610	678	19,400	5.21	2,920	37,000	77	485	1,550	660	11,700
		16/12/2020	**0089_PW380_201216**	**EP2014090**	<1	121	<1	121	639	673	20,400	2.60	2,950	40,500	45	498	1,550	645	11,600
		17/03/2021	**0089_PW380_210317**	**EP2102901**	<1	137	<1	137	708	719	22,700	0.76	3,140	43,200	314	510	1,600	723	12,500
		8/06/2021	**0089_PW380_210608**	**EP2106450**	<1	120	<1	120	588	657	18,800	5.57	2,640	42,300	88	466	1,480	630	11,400
		30/08/2021	**0089_PW380_210830**	**EP2110017**	<1	119	<1	119	553	599	17,700	4.00	2,470			429	1,340	592	10,400
WWTP	PW381	**19/04/2018**	**0089_PW381_180419**	**209623**															
		30/01/2020	**0089_PW381_200130**	**EP2001003**	<1	120	<1	120	634	668	20,300	2.63	2,810	42,800	38	460	1,480	552	11,700
		2/04/2020	**0089_PW381_200402**	**EP2003474**	<1	119	<1	119	643	729	20,600	6.28	2,860	41,100	65	510	1,660	745	12,600
		21/07/2020	**0089_PW381_200721**	**EP2007594**	<1	125	<1	125	578	683	18,400	8.34	2,720	40,700	190	482	1,520	649	11,900
		23/09/2020	**0089_PW381_200923**	**EP2010217**	<1	188	<1	188	612	686	19,400	5.72	2,920	36,600	354	480	1,550	661	11,900
		16/12/2020	**0089_PW381_201216**	**EP2014104**	<1	113	<1	113	626	665	20,000	3.08	2,840	42,700	36	475	1,520	635	11,500
		17/03/2021	**0089_PW381_210317**	**EP2102901**	<1	125	<1	125	632	697	20,200	4.87	2,870	40,700	105	504	1,550	696	12,100
		8/06/2021	**0089_PW381_210608**	**EP2106450**	<1	115	<1	115	568	660	18,000	7.48	2,780	42,000	31	458	1,470	613	11,500
		30/08/2021	**0089_PW381_210830**	**EP2110017**	<1	119	<1	119	554	640	17,700	7.22	2,490			462	1,430	631	11,100
WWTP	PW401	**19/04/2018**	**0089_PW379_180419**	**209623**															
		30/01/2020	**0089_PW401_200130**	**EP2001003**	<1	122	<1	122	623	663	19,900	3.12	2,850	42,400	99	453	1,480	556	11,600
		2/04/2020	**0089_PW401_200402**	**EP2003474**	<1	117	<1	117	586	686	18,600	7.85	2,840	42,300	162	496	1,570	735	11,800
		21/07/2020	**0089_PW401_200721**	**EP2007594**	<1	124	<1	124	578	650	18,400	5.94	2,690	41,600	85	462	1,460	616	11,300
		23/09/2020	**0089_PW401_200923**	**EP2010220**	<1	118	<1	118	636	701	20,400	4.87	2,800	36,800	77	499	1,610	683	12,100
		16/12/2020	**0089_PW401_201216**	**EP2014090**	<1	122	<1	122	632	667	20,200	2.66	2,890	39,700	76	493	1,530	635	11,500
		17/03/2021	**0089_PW401_210317**	**EP2102901**	<1	130	<1	130	663	675	21,200	0.91	2,980	41,500	136	487	1,510	680	11,700
		8/06/2021	**0089_PW401_210608**	**EP2106450**	<1	116	<1	116	573	653	18,200	6.51	2,760	42,800	152	450	1,450	598	11,400
		30/08/2021	**0089_PW401_210830**	**EP2110017**	<1	118	<1	118	548	628	17,500	6.79	2,490			453	1,400	617	10,900
HSF	PW405	**14/01/2020**	**0089_PW405_200114**	**EP2000432**	<1	125	<1	125	658	790	21,000	9.07	3,050	45,500	52	551	1,770	809	13,700
		1/04/2020	**0089_PW405_200401**	**EP2003417**	<1	166	<1	166	677	770	21,700	6.38	2,980	40,500	47	575	1,800	736	13,200
		22/07/2020	**0089_PW405_200722**	**EP2007648**	<1	150	<1	150	600	585	19,300	1.24	2,510	36,100	208	397	1,250	558	10,300
		21/09/2020	**0089_PW405_200921**	**EP2010085**	<1	136	<1	136	563	716	17,700	11.9	2,930	38,600	26	516	1,610	701	12,400
		15/12/2020	**0089_PW405_201215**	**EP2014048**	<1	133	<1	133	647	704	20,700	4.18	2,910	37,100	209	505	1,580	692	12,200
		15/03/2021	**0089_PW405_210315**	**EP2102752**	<1	105	<1	105	662	709	21,200	3.45	2,950	42,700	1,060	486	1,560	660	12,400
		10/06/2021	**0089_PW405_210610**	**EP2106590**	<1	206	<1	206	164	159	5,130	1.26	707	9,310	33	254	378	135	2,580
		31/08/2021	**0089_PW405_210831**	**EP2110065**	<1	132	<1	132	558	581	17,900	2.01	2,410			407	1,310	515	10,100
HSF	PW407	**14/01/2020**	**0089_PW407_200114**	**EP2000432**	<1	174	<1	174	622	762	19,800	10.2	2,860	41,800	70	536	1,720	783	13,200
		1/04/2020	**0089_PW407_200401**	**EP2003417**	<1	206	<1	206	536	617	17,100	7.02	2,390	33,200	146	455	1,380	606	10,700
		22/07/2020	**0089_PW407_200722**	**EP2007648**	<1	156	<1	156	524	549	16,700	2.30	2,390	36,900	386	376	1,170	523	9,660
		21/09/2020	**0089_PW407_200921**	**EP2010085**	<1	133	<1	133	566	674	17,800	8.74	2,930	40,200	2,440	449	1,540	630	11,700
		15/12/2020	**0089_PW407_201215**	**EP2014053**	<1	136	<1	136	638	710	20,200	5.39	3,130	44,000	240	516	1,600	700	12,300
		15/03/2021	**0089_PW407_210315**	**EP2102752**	<1	110	<1	110	649	714	20,800	4.77	2,890	44,500	16,500	488	1,570	659	12,500
		10/06/2021	**0089_PW407_210610**	**EP2106590**	<1	189	<1	189	537	611	17,200	6.46	2,310	42,700	326	445	1,370	597	10,600
		31/08/2021	**0089_PW407_210831**	**EP2110065**	<1	135	<1	135	556	581	17,800	2.22	2,440			408	1,310	521	10,100
HSF	PW409	**14/01/2020**	**0089_PW409_200114**	**EP2000432**	<1	138	<1	138	651	774	20,700	8.59	3,100	42,400	206	551	1,740	783	13,400
		1/04/2020	**0089_PW409_200401**	**EP2003417**	<1	145	<1	145	625	760	20,000	9.74	2,800	39,600	161	554	1,690	763	13,200
		21/07/2020	**0089_PW409_200721**	**EP2007611**	<1	137	<1	137	552	622	17,500	6.02	2,650	28,300	318	485	1,360	641	10,800
		22/09/2020	**0089_PW409_200922**	**EP2010143**	<1	126	<1	126	626	662	20,100	2.79	2,740	41,300	79	455	1,450	622	11,600
		15/12/2020	**0089_PW409_201215**	**EP2014044**	<1	123	<1	123	615	724	19,600	8.14	2,850	35,200	64	504	1,620	667	12,600
		17/03/2021	**0089_PW409_210317**	**EP2102901**	<1	138	<1	138	714	828	22,800	7.43	3,270	47,200	85	585	1,840	844	14,400
		10/06/2021	**0089_PW409_210610**	**EP2106590**	<1	113	<1	113	583	658	18,700	5.99	2,580	40,800	298	475	1,480	642	11,400
		31/08/2021	**0089_PW409_210831**	**EP2110065**	<1	124	<1	124	553	586	17,700	2.90	2,470			414	1,320	521	10,200
HSF	PW411	**14/01/2020**	**0089_PW411_200114**	**EP2000432**	<1	121	<1	121	575	698	18,100	9.67	2,960	41,400	78	557	1,600	632	12,000
		1/04/2020	**0089_PW411_200401**	**EP2003417**	<1	128	<1	128	614	717	19,600	7.76	2,800	38,700	149	523	1,630	681	12,400
		21/07/2020	**0089_PW411_200721**	**EP2007611**	<1	127	<1	127	577	656	18,400	6.44	2,660	42,000	114	508	1,430	681	11,400
		22/09/2020	**0089_PW411_200922**	**EP2010143**	<1	118	<1	118	630	640	20,200	0.75	2,780	40,600	35	436	1,400	603	11,200
		15/12/2020	**0089_PW411_201215**	**EP2014044**	<1	120	<1	120	616	694	19,600	5.94	2,940	39,500	64	484	1,550	637	12,100
		18/03/2021	**0089_PW411_210318**	**EP2102956**	<1	137	<1	137	634	634	20,300	0.03	2,800	43,000	137	457	1,430	592	11,000
		9/06/2021	**0089_PW411_210609**	**EP2106519**	<1	115	<1	115	587	674	18,800	6.88	2,630	33,300	66	479	1,520	633	11,700
		1/09/2021	**0089_PW411_210901**	**EP2110154**	<1	121	<1	121	561	650	18,100	7.37	2,290			456	1,460	604	11,300
HSF	PW413	**14/01/2020**	**0089_PW413_200114**	**EP2000432**	<1	137	<1	137	631	751	20,100	8.69	2,950	42,200	189	542	1,690	772	13,000
		1/04/2020	**0089_PW413_200401**	**EP2003417**	<1	297	<1	297	451	484	14,200	3.53	2,120	26,300	180	405	1,090	496	8,300
		21/07/2020	**0089_PW413_200721**	**EP2007611**	<1	202	<1	202	574	696	18,200	9.64	2,700	43,100	313	615	1,520	717	12,000
		22/09/2020	**0089_PW413_200922**	**EP2010143**	<1	96	<1	96	604	611	19,400	0.53	2,660	41,000	40	412	1,340	576	10,700
		15/12/2020	**0089_PW413_201215**	**EP2014044**	<1	125	<1	125	616	720	19,600	7.84	2,900	35,400	30	496	1,590	658	12,600
		18/03/2021	**0089_PW413_210318**	**EP2102941**	<1	198	<1	198	615	680	19,500	5.09	2,910	42,800	395	501	1,530	638	11,800
		9/06/2021	**0089_PW413_210609**	**EP2106519**	<1	118	<1	118	587	673	18,800	6.87	2,590	38,900	162	477	1,510	634	11,700
		1/09/2021	**0089_PW413_210901**	**EP2110155**	<1	113	<1	113	549	621	17,700	6.18	2,280			434	1,400	575	10,800
HSF	PW415	**14/01/2020**	**0089_PW415_200114**	**EP2000432**	<1	128	<1	128	616	739	19,600	9.06	2,930	41,400	203	537	1,660	748	12,800
		1/04/2020	**0089_PW415_200401**	**EP2003417**	<1	213	<1	213	276	296	8,650	3.44	1,340	16,600	140	274	734	320	4,910
		21/07/2020	**0089_PW415_200721**	**EP2007611**	<1	148	<1	148	570	669	18,200	7.98	2,600	41,900	455	536	1,460	700	11,600
		22/09/2020	**0089_PW415_200922**	**EP2010145**	<1	121	<1	121	608	665	19,400	4.51	2,790	42,700	23	484	1,510	648	11,500
		15/12/2020	**0089_PW415_201215**	**EP2014044**	<1	126	<1	126	619	730	19,700	8.25	2,910	38,500	45	505	1,640	684	12,700
		18/03/2021	**0089_PW415_210318**	**EP2102941**	<1	143	<1	143	410	402	12,900	0.98	2,080	25,500	64	294	881	392	7,010
		9/06/2021	**0089_PW415_210609**	**EP2106519**	<1	125	<1	125	579	703	18,500	9.64	2,630	37,400	172	499	1,580	666	12,200
		1/09/2021	**0089_PW415_210901**	**EP2110155**	<1	116	<1	116	555	638	17,900	6.92	2,310			447	1,430	592	11,100

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Drinking Water

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

					PFAS - Perfluoroalkyl Carboxylic Acids															PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																	*0.07*		
PFAS NEMP 2020 Interim Marine 99%									0.00023						19																			
PFAS NEMP 2020 Recreational Water															**10**																	**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																														
FTA	**SW130**	**17/07/2017**	**0089_SW130_170717**	**198331**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		8/01/2020	**0089_SW130_200108**	**EP2000180**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	**0089_SW130_200330**	**EP2003316**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/07/2020	**0089_SW130_200715**	**EP2007383**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		22/09/2020	**0089_SW130_200922**	**EP2010153**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	**0089_SW130_201214**	**EP2013985**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	0.09	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.09	0.09
		15/03/2021	**0089_SW130_210315**	**EP2102756**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		8/06/2021	**0089_SW130_210608**	**EP2106465**	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05
		30/08/2021	**0089_SW130_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
FTA	**SW132**	**17/07/2017**	**0089_SW132_170717**	**198331**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		8/01/2020	**0089_SW132_200108**	**EP2000180**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	**0089_SW132_200330**	**EP2003316**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/07/2020	**0089_SW132_200715**	**EP2007383**	<0.02	<0.02	<0.02	<0.02	0.07	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.07	0.07	0.07
		22/09/2020	**0089_SW132_200922**	**EP2010153**	<0.02	<0.02	0.03	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		14/12/2020	**0089_SW132_201214**	**EP2013988**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/03/2021	**0089_SW132_210315**	**EP2102756**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		8/06/2021	**0089_SW132_210608**	**EP2106465**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		30/08/2021	**0089_SW132_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
FTA	**SW134**	**17/07/2017**	**0089_SW134_170717**	**198331**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.01	<0.01	<0.1	<0.05	<0.02	<0.05	<0.1	<0.02	<0.5			
		8/01/2020	**0089_SW134_200108**	**EP2000180**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/03/2020	**0089_SW134_200331**	**EP2003367**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/07/2020	**0089_SW134_200715**	**EP2007383**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/09/2020	**0089_SW134_200922**	**EP2010153**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		14/12/2020	**0089_SW134_201214**	**EP2013988**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/03/2021	**0089_SW134_210315**	**EP2102756**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		8/06/2021	**0089_SW134_210608**	**EP2106450**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	**0089_SW134_210830**	**EP2110021**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Demolition Ground	**SW150**	**24/08/2017**	**0089_SW150_170824**	**199846**	<0.001	<0.001	<0.001	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_SW150_200108**	**EP2000180**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	**0089_SW150_200330**	**EP2003309**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	**0089_SW150_200720**	**EP2007545**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	**0089_SW150_200923**	**EP2010218**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	**0089_SW150_201214**	**EP2013973**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	**0089_SW150_210316**	**EP2102836**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	**0089_SW150_210608**	**EP2106465**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	**0089_SW150_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Demolition Ground	**SW152**	**24/08/2017**	**0089_SW152_170824**	**199846**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_SW152_200108**	**EP2000180**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	**0089_SW152_200330**	**EP2003309**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	**0089_SW152_200720**	**EP2007545**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	**0089_SW152_200923**	**EP2010218**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	**0089_SW152_201214**	**EP2013973**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	**0089_SW152_210316**	**EP2102836**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	**0089_SW152_210608**	**EP2106465**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	**0089_SW152_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Demolition Ground	**SW154**	**24/08/2017**	**0089_SW154_170824**	**199846**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_SW154_200108**	**EP2000180**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	**0089_SW154_200330**	**EP2003309**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	**0089_SW154_200720**	**EP2007545**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/09/2020	**0089_SW154_200922**	**EP2010153**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	**0089_SW154_201214**	**EP2013989**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	**0089_SW154_210316**	**EP2102836**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	**0089_SW154_210608**	**EP2106465**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	**0089_SW154_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Demolition Ground	**SW156**	**24/08/2017**	**0089_SW156_170824**	**199846**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_SW156_200108**	**EP2000180**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	**0089_SW156_200330**	**EP2003309**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	**0089_SW156_200720**	**EP2007545**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	**0089_SW156_200923**	**EP2010218**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	**0089_SW156_201214**	**EP2013989**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/03/2021	**0089_SW156_210316**	**EP2102836**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	**0089_SW156_210608**	**EP2106465**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	**0089_SW156_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
WWTP	**SW305**	**17/04/2018**	**0089_SW305_180417**	**209522**	<0.001	<0.001	0.003	<0.001	0.008	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_SW305_200108**	**EP2000183**	<0.02	<0.02	<0.02	<0.02

					PFAS - Perfluoroalkyl Carboxylic Acids															PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides								PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting					0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water															*0.56*																		*0.07*		
PFAS NEMP 2020 Interim Marine 99%									0.00023						19																				
PFAS NEMP 2020 Recreational Water															**10**																		**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																															
	SW318	**21/09/2020**	**0089_SW318_200921**	**EP2010083**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	**0089_SW318_201214**	**EP2013989**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/03/2021	**0089_SW318_210315**	**EP2102758**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		10/06/2021	**0089_SW318_210610**	**EP2106582**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	**0089_SW318_210831**	**EP2110068**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
	SW319	**18/04/2018**	**0089_SW319_180418**	**209573**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_SW319_200108**	**EP2000183**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/03/2020	**0089_SW319_200330**	**EP2003314**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/07/2020	**0089_SW319_200721**	**EP2007604**	<0.02	<0.02	0.03	<0.02	0.1	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.13*	0.13	0.13
		21/09/2020	**0089_SW319_200921**	**EP2010083**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		14/12/2020	**0089_SW319_201214**	**EP2013989**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/03/2021	**0089_SW319_210315**	**EP2102758**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		10/06/2021	**0089_SW319_210610**	**EP2106582**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		31/08/2021	**0089_SW319_210831**	**EP2110068**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
	SW353	**19/04/2018**	**0089_SW353_180419**	**209623**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		30/01/2020	**0089_SW353_200130**	**EP2001004**	<0.02	<0.02	<0.02	<0.02	0.52	<0.02	<0.1	<0.02	<0.02	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.52*	0.53	0.53
		2/04/2020	**0089_SW353_200402**	**EP2003473**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/07/2020	**0089_SW353_200721**	**EP2007595**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
WWTP		**23/09/2020**	**0089_SW353_200923**	**EP2010222**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		16/12/2020	**0089_SW353_201216**	**EP2014090**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	**0089_SW353_210317**	**EP2102901**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		8/06/2021	**0089_SW353_210608**	**EP2106450**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		30/08/2021	**0089_SW353_210830**	**EP2110017**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
	SW370	**17/04/2018**	**0089_SW370_180417**	**209522**	<0.001	<0.001	0.003	<0.001	0.008	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		9/01/2020	**0089_SW370_200109**	**EP2000249**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	0.03	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.05	0.05
		31/03/2020	**0089_SW370_200331**	**EP2003372**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		15/07/2020	**0089_SW370_200715**	**EP2007383**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
WWTP		**24/09/2020**	**0089_SW370_200924**	**EP2010274**	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.08*	0.08	0.08
		15/12/2020	**0089_SW370_201215**	**EP2014053**	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05
		16/03/2021	**0089_SW370_210316**	**EP2102834**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		9/06/2021	**0089_SW370_210609**	**EP2106517**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		1/09/2021	**0089_SW370_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
	SW371	**17/04/2018**	**0089_SW371_180417**	**209522**	<0.001	<0.001	0.003	<0.001	0.009	<0.002	<0.002	<0.002	0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_SW371_200108**	**EP2000183**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		1/04/2020	**0089_SW371_200401**	**EP2003414**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		20/07/2020	**0089_SW371_200720**	**EP2007545**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
WWTP		**22/09/2020**	**0089_SW371_200922**	**EP2010145**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		15/12/2020	**0089_SW371_201215**	**EP2014048**	<0.02	<0.02	<0.02	<0.02	0.31	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.31*	0.31	0.31
		15/03/2021	**0089_SW371_210315**	**EP2102758**	<0.02	<0.02	0.02	<0.02	0.22	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.24*	0.24	0.24
		10/06/2021	**0089_SW371_210610**	**EP2106590**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/09/2021	**0089_SW371_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
	SW372	**13/04/2018**	**0089_SW372_180413**	**209417**	0.002	0.003	0.017	0.002	0.042	<0.002	<0.002	<0.002	0.006	<0.001	0.002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_SW372_200108**	**EP2000183**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		31/03/2020	**0089_SW372_200331**	**EP2003372**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
WWTP		**20/07/2020**	**0089_SW372_200720**	**EP2007545**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		22/09/2020	**0089_SW372_200922**	**EP2010145**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
		15/12/2020	**0089_SW372_201215**	**EP2014044**	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		17/03/2021	**0089_SW372_210317**	**EP2102901**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		10/06/2021	**0089_SW372_210610**	**EP2106590**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/09/2021	**0089_SW372_210901**	**EP2110154**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
	SW373	**13/04/2018**	**0089_SW373_180413**	**209417**	0.002	0.002	0.020	0.002	0.042	<0.002	<0.002	<0.002	0.005	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		8/01/2020	**0089_SW373_200108**	**EP2000183**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		31/03/2020	**0089_SW373_200331**	**EP2003372**	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
WWTP		**20/07/2020**	**0089_SW373_200720**	**EP2007545**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/09/2020	**0089_SW373_200922**	**EP2010145**	<0.02	<0.02	0.12	<0.02	0.44	<0.02	<0.1	<0.02	0.02	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.56*	0.59	0.59
		15/12/2020	**0089_SW373_201215**	**EP2014044**	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05
		17/03/2021	**0089_SW373_210317**	**EP2102901**	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		10/06/2021	**0089_MW373_210610**	**EP2106579**	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02
		30/08/2021	**0089_SW373_210830**	**EP2110017**	<0.02	<0.02	0.03	<0.02	0.37	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	*0.40*	0.40	0.40
	SW382	**19/04/2018**	**0089_SW382_180419**	**209623**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
		30/01/2020	**0089_SW382_200130**	**EP2001004**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		2/04/2020	**0089_SW382_200402**	**EP2003473**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
WWTP		**21/07/2020**	**0089_SW382_200721**	**EP2007595**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		23/09/2020	**0089_SW382_200923**	**EP2010218**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		16/12/2020	**0089_SW382_201216**	**EP2014104**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		17/03/2021	**0089_SW382_210317**	**EP2102892**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05

								PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
								Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
								µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting								0.001	0.001	0.001	0.001	0.0001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.001	0.005	0.005
PFAS NEMP 2020 Drinking Water												*0.56*																			*0.07*		
PFAS NEMP 2020 Interim Marine 99%												19																					
PFAS NEMP 2020 Recreational Water												**10**																			**2**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																													
HSF	**SW412**	**21/07/2020**	**0089_SW412_200721**	**EP2007604**	<0.02	<0.02	<0.02	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01
		22/09/2020	**0089_SW412_200922**	**EP2010145**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	**0089_SW412_201215**	**EP2014044**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		18/03/2021	**0089_SW412_210318**	**EP2102956**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		9/06/2021	**0089_SW412_210609**	**EP2106517**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/09/2021	**0089_SW412_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
HSF	**SW414**	**14/01/2020**	**0089_SW414_200114**	**EP2000422**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		2/04/2020	**0089_SW414_200402**	**EP2003473**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/07/2020	**0089_SW414_200721**	**EP2007604**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/09/2020	**0089_SW414_200922**	**EP2010145**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	**0089_SW414_201215**	**EP2014044**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		18/03/2021	**0089_SW414_210318**	**EP2102941**	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04
		9/06/2021	**0089_SW414_210609**	**EP2106517**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/09/2021	**0089_SW414_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
HSF	**SW416**	**14/01/2020**	**0089_SW416_200114**	**EP2000422**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		2/04/2020	**0089_SW416_200402**	**EP2003473**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		21/07/2020	**0089_SW416_200721**	**EP2007604**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		22/09/2020	**0089_SW416_200922**	**EP2010145**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		15/12/2020	**0089_SW416_201215**	**EP2014044**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		18/03/2021	**0089_SW416_210318**	**EP2102941**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		9/06/2021	**0089_SW416_210609**	**EP2106517**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
		1/09/2021	**0089_SW416_210901**	**EP2110155**	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Drinking Water

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

					Inorganics															
					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
FTA	**SW130**	**17/07/2017**	**0089_SW130_170717**	**198331**															
		8/01/2020	**0089_SW130_200108**	**EP2000180**	5	112	<1	117	620	689	20,000	5.25	2,590	44,500	12	508	1,540	593	12,000
		30/03/2020	**0089_SW130_200330**	**EP2003316**	<1	117	<1	117	609	695	19,500	6.60	2,720	41,400	156	523	1,630	673	11,900
		15/07/2020	**0089_SW130_200715**	**EP2007383**	<1	124	<1	124	589	654	18,800	5.24	2,720	42,900	16	467	1,410	586	11,500
		22/09/2020	**0089_SW130_200922**	**EP2010153**	<1	132	<1	132	613	674	19,600	4.72	2,760	40,300	110	485	1,510	641	11,700
		14/12/2020	**0089_SW130_201214**	**EP2013985**	<1	134	<1	134	622	704	19,800	6.18	2,910	38,900	114	498	1,590	677	12,200
		15/03/2021	**0089_SW130_210315**	**EP2102756**	<1	108	<1	108	589	714	18,700	9.61	2,850	41,000	643	491	1,570	658	12,500
		8/06/2021	**0089_SW130_210608**	**EP2106465**	<1	117	<1	117	592	650	18,900	4.68	2,720	43,600	1,060	464	1,460	606	11,300
		30/08/2021	**0089_SW130_210830**	**EP2110021**	<1	119	<1	119	559	583	17,700	2.09	2,770			424	1,310	584	10,100
FTA	**SW132**	**17/07/2017**	**0089_SW132_170717**	**198331**		140					20,000	-0.52				410	1,300	380	11,000
		8/01/2020	**0089_SW132_200108**	**EP2000180**	7	112	<1	118	628	700	20,200	5.41	2,690	43,200	10	514	1,560	601	12,200
		30/03/2020	**0089_SW132_200330**	**EP2003316**	<1	120	<1	120	609	726	19,500	8.80	2,720	41,100	1,740	535	1,680	700	12,500
		15/07/2020	**0089_SW132_200715**	**EP2007383**	<1	123	<1	123	593	671	18,900	6.19	2,740	42,700	18	474	1,440	602	11,800
		22/09/2020	**0089_SW132_200922**	**EP2010153**	<1	134	<1	134	619	661	19,800	3.31	2,760	39,900	274	462	1,480	625	11,500
		14/12/2020	**0089_SW132_201214**	**EP2013988**	<1	124	<1	124	639	765	20,300	8.99	3,050	38,200	70	561	1,740	757	13,200
		15/03/2021	**0089_SW132_210315**	**EP2102756**	<1	118	<1	118	647	646	20,800	0.07	2,790	43,500	574	424	1,290	392	11,700
		8/06/2021	**0089_SW132_210608**	**EP2106465**	<1	117	<1	117	588	618	18,800	2.51	2,660	37,800	1,160	441	1,410	580	10,700
		30/08/2021	**0089_SW132_210830**	**EP2110021**	<1	120	<1	120	547	578	17,500	2.69	2,470			420	1,300	578	10,000
FTA	**SW134**	**17/07/2017**	**0089_SW134_170717**	**198331**															
		8/01/2020	**0089_SW134_200108**	**EP2000180**	2	115	<1	118	621	723	19,900	7.57	2,750	44,000	<5	531	1,610	609	12,600
		31/03/2020	**0089_SW134_200331**	**EP2003367**	<1	130	<1	130	613	736	19,600	9.16	2,760	39,200	116	542	1,740	713	12,600
		15/07/2020	**0089_SW134_200715**	**EP2007383**	<1	123	<1	123	596	687	19,000	7.13	2,760	43,100	15	486	1,470	621	12,100
		22/09/2020	**0089_SW134_200922**	**EP2010153**	<1	135	<1	135	610	701	19,500	6.97	2,750	39,800	82	489	1,570	670	12,200
		14/12/2020	**0089_SW134_201214**	**EP2013988**	<1	133	<1	133	635	739	20,200	7.57	3,020	38,600	31	535	1,670	726	12,800
		15/03/2021	**0089_SW134_210315**	**EP2102756**	<1	113	<1	113	592	721	18,900	9.76	2,740	42,700	172	495	1,590	666	12,600
		8/06/2021	**0089_SW134_210608**	**EP2106450**	<1	116	<1	116	562	676	17,800	9.18	2,780	37,000	467	467	1,500	626	11,800
		30/08/2021	**0089_SW134_210830**	**EP2110021**	<1	117	<1	117	558	600	17,800	3.69	2,560			435	1,350	600	10,400
Demolition Ground	**SW150**	**24/08/2017**	**0089_SW150_170824**	**199846**															
		8/01/2020	**0089_SW150_200108**	**EP2000180**	<1	118	<1	118	538	655	17,200	9.84	2,410	43,700	8	454	1,470	610	11,400
		30/03/2020	**0089_SW150_200330**	**EP2003309**	<1	115	<1	115	578	692	18,400	8.92	2,750	40,300	<5	485	1,560	680	12,000
		20/07/2020	**0089_SW150_200720**	**EP2007545**	<1	122	<1	122	596	702	19,100	8.16	2,650	42,000	12	493	1,540	624	12,300
		23/09/2020	**0089_SW150_200923**	**EP2010218**	<1	124	<1	124	615	658	19,500	3.37	3,020	36,800	56	474	1,490	635	11,400
		14/12/2020	**0089_SW150_201214**	**EP2013973**	<1	121	<1	121	609	724	19,400	8.62	2,840	35,200	198	518	1,650	716	12,500
		16/03/2021	**0089_SW150_210316**	**EP2102836**	<1	113	<1	113	653	768	20,900	8.12	2,940	42,400	145	542	1,700	732	13,400
		8/06/2021	**0089_SW150_210608**	**EP2106465**	<1	114	<1	114	597	621	19,100	1.98	2,670	42,400	73	438	1,390	578	10,800
		30/08/2021	**0089_SW150_210830**	**EP2110017**	<1	123	<1	123	547	612	17,500	5.58	2,440			445	1,370	606	10,600
Demolition Ground	**SW152**	**24/08/2017**	**0089_SW152_170824**	**199846**		130					19,000	-0.4				410	1,300	390	11,000
		8/01/2020	**0089_SW152_200108**	**EP2000180**	<1	111	<1	111	602	711	19,400	8.31	2,520	44,400	11	526	1,580	600	12,400
		30/03/2020	**0089_SW152_200330**	**EP2003309**	<1	115	<1	115	584	736	18,600	11.6	2,740	40,600	<5	516	1,650	714	12,800
		20/07/2020	**0089_SW152_200720**	**EP2007545**	<1	123	<1	123	599	685	19,200	6.64	2,660	41,500	59	480	1,500	603	12,000
		23/09/2020	**0089_SW152_200923**	**EP2010218**	<1	125	<1	125	605	692	19,200	6.70	2,920	37,100	188	489	1,560	666	12,000
		14/12/2020	**0089_SW152_201214**	**EP2013973**	<1	120	<1	120	608	688	19,400	6.16	2,810	37,000	174	495	1,560	677	11,900
		16/03/2021	**0089_SW152_210316**	**EP2102836**	<1	114	<1	114	656	725	21,000	5.00	2,930	42,400	104	515	1,620	690	12,600
		8/06/2021	**0089_SW152_210608**	**EP2106465**	<1	113	<1	113	589	650	18,800	4.97	2,700	38,400	92	463	1,460	611	11,300
		30/08/2021	**0089_SW152_210830**	**EP2110017**	<1	105	<1	105	554	578	17,400	2.05	2,950			417	1,300	577	10,000
Demolition Ground	**SW154**	**24/08/2017**	**0089_SW154_170824**	**199846**		130					20,000	1.2				420	1,300	400	11,000
		8/01/2020	**0089_SW154_200108**	**EP2000180**	<1	118	<1	118	576	700	18,400	9.68	2,650	43,800	<5	515	1,560	600	12,200
		30/03/2020	**0089_SW154_200330**	**EP2003309**	<1	115	<1	115	583	714	18,600	10.1	2,710	40,900	<5	497	1,610	700	12,400
		20/07/2020	**0089_SW154_200720**	**EP2007545**	<1	123	<1	123	585	652	18,700	5.38	2,660	41,300	56	458	1,440	574	11,400
		22/09/2020	**0089_SW154_200922**	**EP2010153**	<1	124	<1	124	619	695	19,800	5.79	2,800	42,700	126	494	1,550	662	12,100
		14/12/2020	**0089_SW154_201214**	**EP2013989**	<1	122	<1	122	636	733	20,200	7.11	3,050	35,400	164	518	1,660	714	12,700
		16/03/2021	**0089_SW154_210316**	**EP2102836**	<1	114	<1	114	663	702	21,300	2.84	2,870	43,000	58	493	1,570	670	12,200
		8/06/2021	**0089_SW154_210608**	**EP2106465**	<1	111	<1	111	588	651	18,800	5.16	2,640	43,000	50	465	1,470	614	11,300
		30/08/2021	**0089_SW154_210830**	**EP2110017**	<1	115	<1	115	547	568	17,500	1.88	2,440			406	1,270	566	9,850
Demolition Ground	**SW156**	**24/08/2017**	**0089_SW156_170824**	**199846**															
		8/01/2020	**0089_SW156_200108**	**EP2000180**	<1	118	<1	118	642	745	20,200	7.37	3,380	44,500	26	549	1,650	629	13,000
		30/03/2020	**0089_SW156_200330**	**EP2003309**	<1	114	<1	114	562	709	17,800	11.6	2,750	40,400	<5	500	1,600	688	12,300
		20/07/2020	**0089_SW156_200720**	**EP2007545**	<1	123	<1	123	594	679	19,000	6.74	2,650	41,000	31	478	1,490	601	11,900
		23/09/2020	**0089_SW156_200923**	**EP2010218**	<1	125	<1	125	619	664	19,700	3.53	2,920	37,600	558	469	1,510	641	11,500
		14/12/2020	**0089_SW156_201214**	**EP2013989**	<1	121	<1	121	620	721	19,600	7.53	3,120	39,200	22	513	1,630	697	12,500
		16/03/2021	**0089_SW156_210316**	**EP2102836**	<1	113	<1	113	663	739	21,200	5.43	3,000	43,200	12	515	1,630	700	12,900
		8/06/2021	**0089_SW156_210608**	**EP2106465**	<1	113	<1	113	567	656	18,000	7.24	2,750	40,800	12	463	1,470	618	11,400
		30/08/2021	**0089_SW156_210830**	**EP2110017**	<1	116	<1	116	544	577	17,400	2.94	2,460			414	1,300	576	10,000
WWTP	**SW305**	**17/04/2018**	**0089_SW305_180417**	**209522**															
		8/01/2020	**0089_SW305_200108**	**EP2000183**	3	121	<1	124	590	679	18,800	7.02	2,760	44,600	<5	465	1,510	558	11,900
		31/03/2020	**0089_SW305_200331**	**EP2003372**	<1	118	<1	118	610	740	19,500	9.67	2,750	42,100	38	521	1,690	719	12,800
		20/07/2020	**0089_SW305_200720**	**EP2007545**	<1	130	<1	130	563	686	18,000	9.79	2,550	40,600	16	480	1,510	608	12,000
		22/09/2020	**0089_SW305_200922**	**EP2010145**	<1	143	<1	143	589	566	18,800	2.00	2,690	40,200	49	406	1,280	538	9,810
		15/12/2020	**0089_SW305_201215**	**EP2014048**	<1	125	<1	125	613	700	19,600	6.58	2,780	41,000	190	510	1,580	696	12,100
		15/03/2021	**0089_SW305_210315**	**EP2102758**	<1	110	<1	110	585	714	18,600	9.99	2,780	42,100	40	496	1,570	658	12,500
		10/06/2021	**0089_SW305_210610**	**EP2106582**	<1	144	<1	144	581	658	18,600	6.20	2,580	41,900	1,530	463	1,500	615	11,400
		1/09/2021	**0089_SW305_210901**	**EP2110154**	<1	118	<1	118	534	598	17,200	5.59	2,250			422	1,340	546	10,400
HSF	**SW309**	**18/04/2018**	**0089_SW309_180418**	**209573**															
		10/01/2020	**0089_SW309_200110**	**EP2000292**	7	110	<1	117	583	701	18,600	9.18	2,700	41,400	7	520	1,570	596	12,200
		31/03/2020	**0089_SW309_200331**	**EP2003369**	<1	115	<1	115	607	702	19,400	7.24	2,750	41,100	10	511	1,660	684	12,000
		22/07/2020	**0089_SW309_200722**	**EP2007649**	<1	120	<1	120	588	666	18,700	6.25	2,800	39,700	<5	449	1,430	517	11,800
		23/09/2020	**0089_SW309_200923**	**EP2010222**	<1	119	<1	119	630	678	20,200	3.60	2,800	39,000	13,400	490	1,550	652	11,700
		15/12/2020	**0089_SW309_201215**	**EP2014048**	<1	140	<1	140	626	693	20,000	5.06	2,860	41,300	154	504	1,560	693	12,000
		17/03/2021	**0089_SW309_210317**	**EP2102892**	<1	109	<1	109	631	565	20,200	5.55	2,850	43,200	10	402	1,240	528	9,870
		9/06/2021	**0089_SW309_210609**	**EP2106519**	<1	114	<1	114	590	668	18,900	6.15	2,630	39,000	26	470	1,500	630	11,600
		31/08/2021	**0089_SW309_210831**	**EP2110065**	<1	117	<1	117	555	579	17,800	2.12	2,450			400	1,300	517	10,100
HSF	**SW310**	**30/04/2018**	**0089_SW310_180430**	**209959**															
		10/01/2020	**0089_SW310_200110**	**EP2000292**	<1	118	<1	118	602	734	19,100	9.89	2,920	42,000	17	548	1,630	620	12,800
		31/03/2020	**0089_SW310_200331**	**EP2003369**	<1	116	<1	116	586	669	18,600	6.69	2,810	41,000	29	479	1,550	696	11,500
		22/07/2020	**0089_SW310_200722**	**EP2007649**	<1	122	<1	122	579	656	18,500	6.20	2,630	41,600	<5	439	1,410	510	11,600
		23/09/2020	**0089_SW310_200923**	**EP2010222**	<1	122	<1	122	627	648	20,100	1.67	2,780	39,600	27,000	470	1,480	631	11,200
		15/12/2020	**0089_SW310_201215**	**EP2014048**	<1	119	<1	119	626	683	20,000	4.33	2,870	41,300	64	496	1,550	679	11,800
		17/03/2021	**0089_SW310_210317**	**EP2102890**	<1	108	<1	108	601	712	19,200	8.52	2,730	42,600	18	505	1,580	700	12,400
		9/06/2021	**0089_SW310_210609**	**EP2106519**	<1	115	<1	115	578	657	18,500	6.40	2,570	37,600	19	466	1,480	618	11,400
		31/08/2021	**0089_SW310_210831**	**EP2110065**	<1	116	<1	116	561	586	18,000	2.18	2,440			406	1,320	522	10,200
HSF	**SW311**	**30/04/2018**	**0089_SW311_180430**	**209959**															
		1/04/2020	**0089_SW311_200401**	**EP2003418**	<1	116	<1	116	592	695	18,800	8.02	2,840	42,400	13	486	1,580	734	12,000
		22/07/2020	**0089_SW311_200722**	**EP2007649**	<1	121	<1	121	577	649	18,400	5.86	2,680	41,900	<5	436	1,390	501	11,500
		23/09/2020	**0089_SW311_200923**	**EP2010222**	<1	120	<1	120	634	704	20,300	5.25	2,840	39,500	26,200	495	1,600	680	12,200
		15/12/2020	**0089_SW311_201215**	**EP2014053**	<1	119	<1	119	633	704	20,100	5.37	3,040	42,300	170	508	1,590	687	12,200
		17/03/2021	**0089_SW311_210317**	**EP2102892**	<1	112	<1	112	623	612	19,800	0.86	2,970	42,400	12	433	1,340	575	10,700
		9/06/2021	**0089_SW311_210609**	**EP2106519**	<1	113	<1	113	572	668	18,300	7.70	2,590	35,400	20	474	1,500	632	11,600
		31/08/2021	**0089_SW311_210831**	**EP2110072**	<1	117	<1	117	548	619	17,600	6.04	2,390			430	1,380	559	10,800
	SW317	**17/04/2018**	**0089_SW317_180417**	**209522**															
		8/01/2020	**0089_SW317_200108**	**EP2000183**	<1	119	<1	119	590	664	18,900	5.86	2,640	44,800	12	456	1,490	552	11,600
		10/01/2020	**0089_SW317_200110**	**EP2000292**	<1	117	<1	117	584	714	18,600	10.0	2,760	41,100	8	464	1,610	584	12,500
		30/03/2020	**0089_SW317_200330**	**EP2003314**	<1	117	<1	117	601	678	19,200	6.01	2,730	40,900	<5	508	1,590	658	11,600
		21/07/2020	**0089_SW317_200721**	**EP2007604**	<1	120	<1	120	576	686	18,300	8.74	2,750	41,900	48	539	1,500	715	11,900
		21/09/2020	**0089_SW317_200921**	**EP2010083**	<1	128	<1	128	545	691	17,200	11.8	2,740	36,500	10	483	1,550	664	12,000
		14/12/2020	**0089_SW317_201214**	**EP2013989**	<1	118	<1	118	630	724	20,000	6.98	3,040	37,600	292	506	1,620	694	12,600
		15/03/2021	**0089_SW317_210315**	**EP2102758**	<1	111	<1	111	636	637	20,400	0.11	2,790	41,400	<5	404	1,270	648	11,400
		10/06/2021	**0089_SW317_210610**	**EP2106582**	<1	113	<1	113	573	662	18,300	7.26	2,610	42,700	14	461	1,500	621	11,500
		31/08/2021	**0089_SW317_210831**	**EP2110068**	<1	121	<1	121	548	627	17,600	6.73	2,350			454	1,400	582	10,900
		18/04/2018	**0089_SW318_180418**	**209573**															
		8/01/2020	**0089_SW318_200108**	**EP2000183**	<1	125	<1	125	610	669	19,400	4.63	2,870	44,600	<5	461	1,490	553	11,700
		30/03/2020	**0089_SW318_200330**	**EP2003314**	<1	118	<1	118	590	714	18,800	9.54	2,730	40,900	<5	502	1,600	694	12,400
		21/07/2020	**0089_SW318_200721**	**EP2007604**	<1	124	<1	124	569	661	18,100	7.46	2,710	41,800	38	467	1,480	624	11,500

					Inorganics															
					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
	SW318	**21/09/2020**	**0089_SW318_200921**	**EP2010083**	<1	136	<1	136	548	680	17,200	10.8	2,870	37,100	12	490	1,520	658	11,800
		14/12/2020	**0089_SW318_201214**	**EP2013989**	<1	123	<1	123	631	726	20,100	7.04	2,940	39,400	60	510	1,640	694	12,600
		15/03/2021	**0089_SW318_210315**	**EP2102758**	<1	111	<1	111	589	709	18,700	9.18	2,870	42,100	<5	485	1,560	653	12,400
		10/06/2021	**0089_SW318_210610**	**EP2106582**	<1	114	<1	114	581	668	18,600	6.97	2,600	42,800	20	467	1,510	628	11,600
		31/08/2021	**0089_SW318_210831**	**EP2110068**	<1	122	<1	122	551	599	17,600	4.22	2,490			435	1,350	551	10,400
	SW319	**18/04/2018**	**0089_SW319_180418**	**209573**															
		8/01/2020	**0089_SW319_200108**	**EP2000183**	<1	117	<1	117	583	690	18,600	8.41	2,700	44,100	10	473	1,530	565	12,100
		30/03/2020	**0089_SW319_200330**	**EP2003314**	<1	116	<1	116	615	744	19,700	9.48	2,750	40,900	<5	549	1,720	720	12,800
		21/07/2020	**0089_SW319_200721**	**EP2007604**	<1	128	<1	128	572	634	18,200	5.14	2,670	41,500	131	497	1,380	652	11,000
		21/09/2020	**0089_SW319_200921**	**EP2010083**	<1	123	<1	123	552	692	17,400	11.3	2,810	37,700	6	454	1,590	654	12,000
		14/12/2020	**0089_SW319_201214**	**EP2013989**	<1	161	<1	161	641	737	20,400	7.00	2,990	40,700	276	520	1,660	706	12,800
		15/03/2021	**0089_SW319_210315**	**EP2102758**	<1	111	<1	111	642	659	20,600	1.35	2,800	42,900	<5	432	1,300	677	11,800
		10/06/2021	**0089_SW319_210610**	**EP2106582**	<1	115	<1	115	581	669	18,600	7.03	2,600	41,900	18	468	1,520	626	11,600
		31/08/2021	**0089_SW319_210831**	**EP2110068**	<1	119	<1	119	549	581	17,600	2.83	2,410			420	1,300	536	10,100
	SW353	**19/04/2018**	**0089_SW353_180419**	**209623**															
		30/01/2020	**0089_SW353_200130**	**EP2001004**	<1	118	<1	118	625	684	20,000	4.52	2,810	41,600	41	473	1,510	560	12,000
		2/04/2020	**0089_SW353_200402**	**EP2003473**	<1	117	<1	117	586	675	18,600	7.05	2,840	39,600	18	491	1,550	722	11,600
		21/07/2020	**0089_SW353_200721**	**EP2007595**	<1	123	<1	123	578	667	18,400	7.08	2,740	40,100	138	471	1,490	627	11,600
WWTP		**23/09/2020**	**0089_SW353_200923**	**EP2010222**	<1	122	<1	122	629	722	20,100	6.92	2,850	39,900	44,500	515	1,640	698	12,500
		16/12/2020	**0089_SW353_201216**	**EP2014090**	<1	121	<1	121	625	655	20,000	2.32	2,810	38,500	35	480	1,500	621	11,300
		17/03/2021	**0089_SW353_210317**	**EP2102901**	<1	112	<1	112	637	673	20,400	2.75	2,850	38,800	34	474	1,500	667	11,700
		8/06/2021	**0089_SW353_210608**	**EP2106450**	<1	104	<1	104	565	665	17,900	8.10	2,800	39,400	18	458	1,480	618	11,600
		30/08/2021	**0089_SW353_210830**	**EP2110017**	<1	116	<1	116	550	588	17,600	3.40	2,450			424	1,320	586	10,200
	SW370	**17/04/2018**	**0089_SW370_180417**	**209522**															
		9/01/2020	**0089_SW370_200109**	**EP2000249**	2	126	<1	128	607	729	19,400	9.10	2,750	40,000	5	516	1,650	746	12,600
		31/03/2020	**0089_SW370_200331**	**EP2003372**	<1	122	<1	122	585	680	18,600	7.53	2,780	41,400	20	487	1,570	700	11,700
		15/07/2020	**0089_SW370_200715**	**EP2007383**	<1	130	<1	130	595	716	19,000	9.26	2,710	41,700	166	506	1,540	642	12,600
WWTP		**24/09/2020**	**0089_SW370_200924**	**EP2010274**	<1	150	<1	150	609	684	19,400	5.81	2,830	36,600	245	470	1,490	634	12,000
		15/12/2020	**0089_SW370_201215**	**EP2014053**	<1	147	<1	147	624	744	19,800	8.81	2,990	43,400	140	544	1,670	726	12,900
		16/03/2021	**0089_SW370_210316**	**EP2102834**	<1	119	<1	119	637	671	20,400	2.62	2,840	43,300	236	474	1,490	626	11,700
		9/06/2021	**0089_SW370_210609**	**EP2106517**	<1	166	<1	166	580	670	18,500	7.19	2,620	39,100	2,430	480	1,520	624	11,600
		1/09/2021	**0089_SW370_210901**	**EP2110154**	<1	122	<1	122	546	626	17,600	6.84	2,250			440	1,400	572	10,900
	SW371	**17/04/2018**	**0089_SW371_180417**	**209522**															
		8/01/2020	**0089_SW371_200108**	**EP2000183**	<1	113	<1	113	591	683	18,700	7.24	2,930	45,400	<5	467	1,500	559	12,000
		1/04/2020	**0089_SW371_200401**	**EP2003414**	<1	130	<1	130	576	652	18,300	6.18	2,770	40,000	18	464	1,510	700	11,200
		20/07/2020	**0089_SW371_200720**	**EP2007545**	<1	127	<1	127	575	651	18,400	6.20	2,550	39,900	18	451	1,430	571	11,400
WWTP		**22/09/2020**	**0089_SW371_200922**	**EP2010145**	<1	149	<1	149	588	546	18,800	3.71	2,650	35,900	36	398	1,240	524	9,450
		15/12/2020	**0089_SW371_201215**	**EP2014048**	<1	140	<1	140	608	682	19,400	5.78	2,770	40,700	28	501	1,540	677	11,800
		15/03/2021	**0089_SW371_210315**	**EP2102758**	<1	186	<1	186	644	655	20,600	0.86	2,820	42,700	53	409	1,320	657	11,700
		10/06/2021	**0089_SW371_210610**	**EP2106590**	<1	129	<1	129	566	647	18,000	6.70	2,670	40,300	821	472	1,460	636	11,200
		1/09/2021	**0089_SW371_210901**	**EP2110154**	<1	119	<1	119	545	620	17,600	6.45	2,220			433	1,390	567	10,800
	SW372	**13/04/2018**	**0089_SW372_180413**	**209417**															
		8/01/2020	**0089_SW372_200108**	**EP2000183**	<1	124	<1	124	593	713	18,900	9.17	2,760	44,700	<5	487	1,580	580	12,500
		31/03/2020	**0089_SW372_200331**	**EP2003372**	<1	118	<1	118	588	709	18,700	9.30	2,800	41,600	25	508	1,630	730	12,200
		20/07/2020	**0089_SW372_200720**	**EP2007545**	<1	129	<1	129	588	686	18,800	7.73	2,630	41,200	21	487	1,510	610	12,000
WWTP		**22/09/2020**	**0089_SW372_200922**	**EP2010145**	<1	140	<1	140	589	576	18,800	1.04	2,670	39,900	26	418	1,310	556	9,970
		15/12/2020	**0089_SW372_201215**	**EP2014044**	<1	104	<1	104	524	567	16,600	3.89	2,590	33,000	27	395	1,270	514	9,870
		17/03/2021	**0089_SW372_210317**	**EP2102901**	<1	113	<1	113	657	739	21,000	5.89	2,990	40,000	26	537	1,660	741	12,800
		10/06/2021	**0089_SW372_210610**	**EP2106590**	<1	162	<1	162	566	677	18,100	8.95	2,490	42,300	765	496	1,530	675	11,700
		1/09/2021	**0089_SW372_210901**	**EP2110154**	<1	120	<1	120	542	628	17,500	7.33	2,220			445	1,420	580	10,900
	SW373	**13/04/2018**	**0089_SW373_180413**	**209417**															
		8/01/2020	**0089_SW373_200108**	**EP2000183**	10	111	<1	121	583	669	18,600	6.87	2,680	45,000	<5	466	1,490	551	11,700
		31/03/2020	**0089_SW373_200331**	**EP2003372**	<1	117	<1	117	610	711	19,500	7.67	2,760	40,800	10	504	1,620	691	12,300
		20/07/2020	**0089_SW373_200720**	**EP2007545**	<1	124	<1	124	591	691	18,900	7.81	2,660	40,300	12	480	1,520	615	12,100
WWTP		**22/09/2020**	**0089_SW373_200922**	**EP2010145**	<1	144	<1	144	579	553	18,500	2.30	2,620	39,200	33	400	1,240	534	9,600
		15/12/2020	**0089_SW373_201215**	**EP2014044**	<1	92	<1	92	500	552	15,600	4.92	2,790	31,400	23	379	1,220	496	9,650
		17/03/2021	**0089_SW373_210317**	**EP2102901**	<1	112	<1	112	631	714	20,100	6.17	2,990	41,400	65	504	1,600	715	12,400
		10/06/2021	**0089_MW373_210610**	**EP2106579**	<1	151	<1	151	576	676	18,400	7.97	2,600	39,200	325	486	1,540	629	11,700
		30/08/2021	**0089_SW373_210830**	**EP2110017**	<1	134	<1	134	516	562	16,500	4.24	2,320			412	1,270	559	9,720
	SW382	**19/04/2018**	**0089_SW382_180419**	**209623**															
		30/01/2020	**0089_SW382_200130**	**EP2001004**	<1	104	<1	104	622	683	19,900	4.67	2,830	42,100	98	474	1,500	559	12,000
		2/04/2020	**0089_SW382_200402**	**EP2003473**	<1	116	<1	116	637	730	20,400	6.81	2,850	40,500	42	512	1,670	749	12,600
		21/07/2020	**0089_SW382_200721**	**EP2007595**	<1	123	<1	123	568	655	18,000	7.12	2,760	39,500	47	460	1,460	616	11,400
WWTP		**23/09/2020**	**0089_SW382_200923**	**EP2010218**	<1	124	<1	124	613	670	19,600	4.45	2,760	36,600	96	475	1,520	647	11,600
		16/12/2020	**0089_SW382_201216**	**EP2014104**	<1	118	<1	118	626	716	20,000	6.71	2,840	40,000	14	504	1,620	698	12,400
		17/03/2021	**0089_SW382_210317**	**EP2102892**	<1	110	<1	110	634	547	20,200	7.29	2,960	41,200	23	392	1,210	506	9,550
		8/06/2021	**0089_SW382_210608**	**EP2106450**	<1	114	<1	114	568	669	18,000	8.15	2,810	40,400	20	458	1,480	619	11,700
		30/08/2021	**0089_SW382_210830**	**EP2110017**	<1	120	<1	120	550	600	17,600	4.34	2,480			434	1,350	600	10,400
	SW383	**19/04/2018**	**0089_SW383_180419**	**209623**															
		30/01/2020	**0089_SW383_200130**	**EP2001004**	<1	117	<1	117	620	653	19,800	2.60	2,820	41,900	11	455	1,460	544	11,400
		2/04/2020	**0089_SW383_200402**	**EP2003473**	<1	116	<1	116	640	707	20,500	4.99	2,840	39,900	15	493	1,620	716	12,200
		21/07/2020	**0089_SW383_200721**	**EP2007595**	<1	123	<1	123	576	694	18,300	9.26	2,770	39,900	10	485	1,540	654	12,100
WWTP		**23/09/2020**	**0089_SW383_200923**	**EP2010222**	<1	120	<1	120	632	681	20,200	3.70	2,880	39,900	45,500	482	1,540	655	11,800
		16/12/2020	**0089_SW383_201216**	**EP2014090**	<1	107	<1	107	626	655	20,000	2.22	2,890	39,800	40	484	1,500	621	11,300
		17/03/2021	**0089_SW383_210317**	**EP2102892**	<1	119	<1	119	624	568	19,900	4.76	2,920	40,200	29	406	1,250	532	9,910
		8/06/2021	**0089_SW383_210608**	**EP2106450**	<1	114	<1	114	568	672	18,000	8.31	2,810	40,900	39	468	1,500	623	11,700
		30/08/2021	**0089_SW383_210830**	**EP2110017**	<1	113	<1	113	539	583	17,200	3.90	2,490			420	1,310	583	10,100
	SW384	**19/04/2018**	**0089_SW384_180419**	**209623**															
		30/01/2020	**0089_SW384_200130**	**EP2001004**	<1	118	<1	118	628	672	20,100	3.41	2,820	41,800	45	464	1,480	555	11,800
		2/04/2020	**0089_SW384_200402**	**EP2003473**	<1	116	<1	116	587	710	18,600	9.51	2,870	39,600	72	517	1,630	762	12,200
		21/07/2020	**0089_SW384_200721**	**EP2007595**	<1	124	<1	124	572	655	18,200	6.69	2,720	40,300	<5	459	1,460	613	11,400
WWTP		**23/09/2020**	**0089_SW384_200923**	**EP2010222**	<1	123	<1	123	626	687	20,000	4.68	2,850	40,100	1,620	489	1,560	663	11,900
		16/12/2020	**0089_SW384_201216**	**EP2014090**	<1	117	<1	117	626	690	20,000	4.91	2,850	38,800	56	511	1,590	647	11,900
		17/03/2021	**0089_SW384_210317**	**EP2102901**	<1	113	<1	113	649	724	20,800	5.50	2,880	41,100	18	512	1,610	716	12,600
		8/06/2021	**0089_SW384_210608**	**EP2106450**	<1	113	<1	113	562	654	17,800	7.58	2,770	40,200	24	454	1,460	608	11,400
		30/08/2021	**0089_SW384_210830**	**EP2110017**	<1	118	<1	118	556	584	17,800	2.44	2,480			421	1,320	586	10,100
	SW406	**14/01/2020**	**0089_SW406_200114**	**EP2000422**	<1	126	<1	126	601	689	17,800	6.80	4,650	42,400	<5	546	1,610	633	11,800
		1/04/2020	**0089_SW406_200401**	**EP2003420**	<1	117	<1	117	598	686	19,000	6.90	2,850	42,700	9	486	1,580	731	11,800
		22/07/2020	**0089_SW406_200722**	**EP2007649**	<1	122	<1	122	590	650	18,800	4.86	2,740	41,200	<5	435	1,400	504	11,500
HSF		**21/09/2020**	**0089_SW406_200921**	**EP2010083**	<1	131	<1	131	560	697	17,600	10.9	2,910	38,000	16	500	1,560	671	12,100
		15/12/2020	**0089_SW406_201215**	**EP2014048**	<1	137	<1	137	620	676	19,800	4.30	2,820	41,200	260	495	1,520	667	11,700
		15/03/2021	**0089_SW406_210315**	**EP2102756**	<1	116	<1	116	592	686	18,800	7.40	2,840	43,500	128	475	1,510	640	12,000
		10/06/2021	**0089_SW406_210610**	**EP2106590**	<1	112	<1	112	584	692	18,600	8.50	2,740	42,400	69	494	1,560	680	12,000
		31/08/2021	**0089_SW406_210831**	**EP2110065**	<1	123	<1	123	545	576	17,500	2.77	2,360			406	1,310	518	10,000
	SW408	**14/01/2020**	**0089_SW408_200114**	**EP2000422**	<1	134	<1	134	598	694	19,100	7.42	2,730	42,800	<5	498	1,570	708	12,000
		1/04/2020	**0089_SW408_200401**	**EP2003420**	<1	119	<1	119	601	691	19,200	7.03	2,720	43,000	<5	482	1,560	666	12,000
		22/07/2020	**0089_SW408_200722**	**EP2007649**	<1	122	<1	122	585	650	18,600	5.28	2,780	42,200	<5	437	1,400	506	11,500
HSF		**21/09/2020**	**0089_SW408_200921**	**EP2010083**	<1	134	<1	134	554	703	17,400	11.9	2,900	37,100	12	500	1,580	682	12,200
		15/12/2020	**0089_SW408_201215**	**EP2014053**	<1	142	<1	142	610	660	19,300	4.01	2,990	40,400	86	488	1,500	657	11,400
		15/03/2021	**0089_SW408_210315**	**EP2102756**	<1	118	<1	118	597	709	19,000	8.60	2,810	42,000	138	489	1,560	664	12,400
		10/06/2021	**0089_SW408_210610**	**EP2106590**	<1	135	<1	135	578	652	18,500	6.04	2,560	39,500	726	468	1,470	638	11,300
		31/08/2021	**0089_SW408_210831**	**EP2110072**	<1	126	<1	126	554	662	17,700	8.88	2,510			478	1,490	600	11,500
	SW410	**14/01/2020**	**0089_SW410_200114**	**EP2000422**	<1	179	<1	179	608	723	19,400	8.63	2,740	44,000	19	519	1,630	741	12,500
		2/04/2020	**0089_SW410_200402**	**EP2003471**	<1	116	<1	116	608	714	19,400	7.98	2,820	43,000	7	510	1,590	706	12,400
		21/07/2020	**0089_SW410_200721**	**EP2007604**	<1	127	<1	127	569	658	18,200	7.22	2,560	40,100	31	520	1,440	686	11,400
HSF		**22/09/2020**	**0089_SW410_200922**	**EP2010145**	<1	130	<1	130	612	647	19,600	2.73	2,740	40,400	9	474	1,460	624	11,200
		15/12/2020	**0089_SW410_201215**	**EP2014044**	<1	141	<1	141	614	689	19,600	5.71	2,820	39,300	35	484	1,540	627	12,000
		17/03/2021	**0089_SW410_210317**	**EP2102901**	<1	112	<1	112	656	755	21,000	7.01	2,960	38,300	8	540	1,690	758	13,100
		10/06/2021	**0089_SW410_210610**	**EP2106590**	<1	110	<1	110	579	675	18,500	7.71	2,620	38,700	80	488	1,520	660	11,700
		31/08/2021	**0089_SW410_210831**	**EP2110065**	<1	124	<1	124	547	585	17,500	3.38	2,450			412	1,310	522	10,200
		14/01/2020	**0089_SW412_200114**	**EP2000422**	<1	115	<1	115	603	720	19,200	8.82	2,860	44,000	68	504	1,610	735	12,500
		1/04/2020	**0089_SW412_200401**	**EP2003418**	<1	117	<1	117	594	681	18,900	6.84	2,800	43,700	12	488	1,570	726	11,700

					Inorganics															
					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	TDS	Total Suspended Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	5	0.5	0.5	0.5	0.5
PFAS NEMP 2020 Drinking Water																			
PFAS NEMP 2020 Interim Marine 99%																			
PFAS NEMP 2020 Recreational Water																			
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**															
HSF	**SW412**	**21/07/2020**	**0089_SW412_200721**	**EP2007604**	<1	122	<1	122	573	656	18,200	6.81	2,740	41,600	63	514	1,430	679	11,400
		22/09/2020	**0089_SW412_200922**	**EP2010145**	<1	140	<1	140	608	625	19,400	1.42	2,770	41,800	47	462	1,420	607	10,800
		15/12/2020	**0089_SW412_201215**	**EP2014044**	<1	119	<1	119	600	712	19,100	8.52	2,820	31,700	12	494	1,590	652	12,400
		18/03/2021	**0089_SW412_210318**	**EP2102956**	<1	111	<1	111	625	638	20,100	0.97	2,700	41,500	10	443	1,430	589	11,100
		9/06/2021	**0089_SW412_210609**	**EP2106517**	<1	116	<1	116	584	714	18,600	9.97	2,760	41,700	6	482	1,590	600	12,500
		1/09/2021	**0089_SW412_210901**	**EP2110155**	<1	118	<1	118	549	631	17,700	6.98	2,260			437	1,410	578	11,000
HSF	**SW414**	**14/01/2020**	**0089_SW414_200114**	**EP2000422**	<1	119	<1	119	618	728	19,300	8.14	3,430	44,300	20	515	1,640	747	12,600
		2/04/2020	**0089_SW414_200402**	**EP2003473**	<1	114	<1	114	592	687	18,800	7.44	2,850	40,600	36	497	1,580	744	11,800
		21/07/2020	**0089_SW414_200721**	**EP2007604**	<1	124	<1	124	573	672	18,200	7.96	2,740	31,200	12	471	1,500	634	11,700
		22/09/2020	**0089_SW414_200922**	**EP2010145**	<1	119	<1	119	608	584	19,400	1.99	2,780	41,600	76	426	1,320	569	10,100
		15/12/2020	**0089_SW414_201215**	**EP2014044**	<1	124	<1	124	605	654	19,200	3.90	2,930	39,200	34	457	1,460	602	11,400
		18/03/2021	**0089_SW414_210318**	**EP2102941**	<1	107	<1	107	601	642	19,200	3.32	2,760	41,800	61	448	1,430	598	11,200
		9/06/2021	**0089_SW414_210609**	**EP2106517**	<1	114	<1	114	583	710	18,700	9.81	2,580	28,200	23	503	1,620	665	12,300
		1/09/2021	**0089_SW414_210901**	**EP2110155**	<1	116	<1	116	547	621	17,600	6.36	2,310			433	1,400	572	10,800
HSF	**SW416**	**14/01/2020**	**0089_SW416_200114**	**EP2000422**	<1	118	<1	118	615	689	19,400	5.69	3,140	44,200	26	486	1,570	710	11,900
		2/04/2020	**0089_SW416_200402**	**EP2003473**	<1	118	<1	118	648	730	20,800	5.97	2,830	39,500	43	511	1,670	753	12,600
		21/07/2020	**0089_SW416_200721**	**EP2007604**	<1	122	<1	122	577	662	18,400	6.86	2,680	41,600	12	470	1,490	628	11,500
		22/09/2020	**0089_SW416_200922**	**EP2010145**	<1	126	<1	126	613	619	19,600	0.43	2,780	42,900	12	454	1,400	600	10,700
		15/12/2020	**0089_SW416_201215**	**EP2014044**	<1	126	<1	126	621	712	19,800	6.77	2,900	40,200	23	495	1,590	654	12,400
		18/03/2021	**0089_SW416_210318**	**EP2102941**	<1	114	<1	114	631	655	20,200	1.88	2,840	42,600	9	461	1,470	608	11,400
		9/06/2021	**0089_SW416_210609**	**EP2106517**	<1	118	<1	118	568	692	18,200	9.87	2,500	38,400	64	492	1,570	645	12,000
		1/09/2021	**0089_SW416_210901**	**EP2110155**	<1	118	<1	118	558	604	18,000	3.94	2,300			424	1,360	548	10,500

Notes:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Drinking Water

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Table 4 - Sediment Analytical Results

					PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting					0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0005	0.0001	0.0001	0.0001	0.0001	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure									*1*						*10*																			
PFAS NEMP 2020 Ecological indirect exposure									0.01																									
PFAS NEMP 2020 Industrial/ commercial (HIL D)															**50**																	**20**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																															
WWTP	SD304	17/04/2018	0089_SD304_180417	209522	<0.0001	<0.0001	<0.0001	<0.0001	0.0004	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		8/01/2020	0089_SD304_200109	EP2000187	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		1/04/2020	0089_SD304_0.40-0.50_200401	EP2003415	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
		20/07/2020	0089_SD304_200720	EP2007546	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		22/09/2020	0089_SD304_200922	EP2010144	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		15/12/2020	0089_SD304_201215	EP2014049	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		15/03/2021	0089_SD304_210315	EP2102757	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		10/06/2021	0089_SD304_210610	EP2106581	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006	0.0006
		1/09/2021	0089_SD304_210901	EP2110157	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
HSF	SD306	18/04/2018	0089_SD306_180418	209573	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		10/01/2020	0089_SD306_200110	EP2000288	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		31/03/2020	0089_SD306_200331_1.00-1.20_20(	EP2003368	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		22/07/2020	0089_SD306_200722	EP2007650	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		23/09/2020	0089_SD306_200923	EP2010219	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		15/12/2020	0089_SD306_201215	EP2014049	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		17/03/2021	0089_SD306_210317	EP2102888	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		9/06/2021	0089_SD306_210609	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		31/08/2021	0089_SD306_210831	EP2110074	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
HSF	SD307	30/04/2018	0089_SD307_180430	209959	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		10/01/2020	0089_SD307_200110	EP2000288	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		31/03/2020	0089_SD307_200331_1.00-1.20_20(	EP2003368	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		22/07/2020	0089_SD307_200722	EP2007650	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		23/09/2020	0089_SD307_200923	EP2010221	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		15/12/2020	0089_SD307_201215	EP2014052	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		17/03/2021	0089_SD307_210317	EP2102888	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		9/06/2021	0089_SD307_210609	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		31/08/2021	0089_SD307_210831	EP2110067	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
HSF	SD308	30/04/2018	0089_SD308_180430	209959	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		10/01/2020	0089_SD308_200110	EP2000288	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		1/04/2020	0089_SD308_1.00-1.20_200401	EP2003416	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		22/07/2020	0089_SD308_200722	EP2007650	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		23/09/2020	0089_SD308_200923	EP2010219	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		15/12/2020	0089_SD308_0.50_201215	EP2014052	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		17/03/2021	0089_SD308_210317	EP2102888	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		9/06/2021	0089_SD308_210609	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		31/08/2021	0089_SD308_210831	EP2110074	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
HSF	SD314	18/04/2018	0089_SD314_180418	209573	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		10/01/2020	0089_SD314_200110	EP2000288	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		31/03/2020	0089_SD314_200331_0.60-0.80_20(	EP2003368	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		22/07/2020	0089_SD314_200722	EP2007650	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		23/09/2020	0089_SD314_200923	EP2010221	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		15/12/2020	0089_SD314_201215	EP2014049	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		17/03/2021	0089_SD314_210317	EP2102888	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		9/06/2021	0089_SD314_210609	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		31/08/2021	0089_SD314_210831	EP2110067	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
HSF	SD315	30/04/2018	0089_SD315_180430	209959	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		10/01/2020	0089_SD315_200110	EP2000288	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		1/04/2020	0089_SD315_1.00-1.20_200401	EP2003416	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		22/07/2020	0089_SD315_200722	EP2007650	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		23/09/2020	0089_SD315_200923	EP2010219	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		15/12/2020	0089_SD315_201215	EP2014049	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		17/03/2021	0089_SD315_210317	EP2102888	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		9/06/2021	0089_SD315_210609	EP2106520	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		31/08/2021	0089_SD315_210831	EP2110074	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
HSF	SD316	30/04/2018	0089_SD316_180430	209959	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		10/01/2020	0089_SD316_200110	EP2000288	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		1/04/2020	0089_SD316_1.20-1.40_200401	EP2003416	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		22/07/2020	0089_SD316_200722	EP2007650	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.

Table 4 - Sediment Analytical Results

					PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting					0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0005	0.0001	0.0001	0.0001	0.0001	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure									*1*						*10*																				
PFAS NEMP 2020 Ecological indirect exposure									0.01																										
PFAS NEMP 2020 Industrial/ commercial (HIL D)															**50**																		**20**		
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Lab Report Number**																															
WWTP	**SD345**	**13/04/2018**	**0089_SD345_180413**	**209417**	<0.0001	<0.0001	<0.0001	<0.0002	0.0005	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		9/01/2020	**0089_SD345_0.30-0.40_200109**	**EP2000250**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		31/03/2020	**0089_SD345_0.40-0.50_200331**	**EP2003371**	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002	0.0002
		24/09/2020	**0089_SD345_200924**	**EP2010272**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		15/12/2020	**0089_SD345_201215**	**EP2014052**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		16/03/2021	**0089_SD345_210316**	**EP2102835**	<0.0002	<0.0002	<0.0002	<0.0002	0.0017	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0017	0.0017	0.0017
		9/06/2021	**0089_SD345_210609**	**EP2106518**	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
		1/09/2021	**0089_SD345_210901**	**EP2110156**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
Accommodation	**SD346**	**17/04/2018**	**0089_SD346_180417**	**209522**	<0.0001	<0.0001	<0.0001	<0.0001	0.0007	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		8/01/2020	**0089_SD346_200109**	**EP2000187**	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006	0.0006
		1/04/2020	**0089_SD346_0.30-0.40_200401**	**EP2003415**	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0009	0.0009	0.0009
		15/07/2020	**0089_SD346_200715**	**EP2007387**	<0.0002	<0.0002	<0.0002	<0.0002	0.0012	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0012	0.0012	0.0012
		22/09/2020	**0089_SD346_200922**	**EP2010144**	<0.0002	<0.0002	0.0002	<0.0002	0.0114	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0116	0.0116	0.0116
		15/12/2020	**0089_SD346_201215**	**EP2014043**	<0.0002	<0.0002	0.0002	<0.0002	0.0094	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0096	0.0096	0.0096
		17/03/2021	**0089_SD346_210317**	**EP2102902**	<0.0002	<0.0002	<0.0002	<0.0002	0.0008	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0008	0.0008	0.0008
		10/06/2021	**0089_SD346_210610**	**EP2106581**	<0.0002	<0.0002	<0.0002	<0.0002	0.0028	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0028	0.0028	0.0028
		30/08/2021	**0089_SD346_210830**	**EP2110018**	<0.0002	<0.0002	<0.0002	<0.0002	0.0024	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0024	0.0024	0.0024
WWTP	**SD350**	**19/04/2018**	**0089_SD350_180419**	**209623**	<0.0001	<0.0001	<0.0001	<0.0001	0.0005	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		30/01/2020	**0089_SD350_200130**	**EP2001005**	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
		2/04/2020	**0089_SD350_200402**	**EP2003477**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		21/07/2020	**0089_SD350_200721**	**EP2007603**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		23/09/2020	**0089_SD350_200923**	**EP2010219**	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
		16/12/2020	**0089_SD350_201216**	**EP2014091**	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
		17/03/2021	**0089_SD350_210317**	**EP2102888**	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0005	0.0005
		8/06/2021	**0089_SD350_210608**	**EP2106466**	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
		30/08/2021	**0089_SD350_210830**	**EP2110018**	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002	0.0002
WWTP	**SD351**	**19/04/2018**	**0089_SD351_180419**	**209623**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		30/01/2020	**0089_SD351_200130**	**EP2001005**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		2/04/2020	**0089_SD351_0.80-0.90_200402**	**EP2003475**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		21/07/2020	**0089_SD351_200721**	**EP2007603**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		23/09/2020	**0089_SD351_200923**	**EP2010219**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		16/12/2020	**0089_SD351_201216**	**EP2014091**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		17/03/2021	**0089_SD351_210317**	**EP2102888**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		8/06/2021	**0089_SD351_210608**	**EP2106466**	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
		30/08/2021	**0089_SD351_210830**	**EP2110018**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
WWTP	**SD352**	**19/04/2018**	**0089_SD352_180419**	**209623**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		30/01/2020	**0089_SD352_200130**	**EP2001005**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		21/07/2020	**0089_SD352_200721**	**EP2007596**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		23/09/2020	**0089_SD352_200923**	**EP2010219**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		16/12/2020	**0089_SD352_201216**	**EP2014091**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		17/03/2021	**0089_SD352_210317**	**EP2102888**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		8/06/2021	**0089_SD352_210608**	**EP2106466**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		30/08/2021	**0089_SD352_210830**	**EP2110018**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
WWTP	**SD356**	**12/04/2018**	**0089_SD356_180412**	**209345**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		10/01/2020	**0089_SD356_200110**	**EP2000253**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		30/03/2020	**0089_SD356_200330_0.50-0.60_20**	**EP2003310**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		20/07/2020	**0089_SD356_200720**	**EP2007546**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		23/09/2020	**0089_SD356_200923**	**EP2010221**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		14/12/2020	**0089_SD356_201214**	**EP2013974**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		16/03/2021	**0089_SD356_210316**	**EP2102838**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		8/06/2021	**0089_SD356_210608**	**EP2106466**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		30/08/2021	**0089_SD356_210830**	**EP2110018**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		12/04/2018	**0089_SD357_180412**	**209345**	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		10/01/2020	**0089_SD357_200110**	**EP2000253**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		30/03/2020	**0089_SD357_200330_0.40-0.50_20**	**EP2003310**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		20/07/2020	**0089_SD357_200720**	**EP2007546**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		**23/09/2

Table 4 - Sediment Analytical Results

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0005	0.0001	0.0001	0.0001	0.0001	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure					*1*						*10*																				
PFAS NEMP 2020 Ecological indirect exposure					0.01																										
PFAS NEMP 2020 Industrial/ commercial (HIL D)											**50**																			**20**		

Monitoring Area	Location Code	Date	Field ID	Lab Report Number																														
		10/06/2021	0089_SD368_210610	EP2106581	<0.0002	<0.0002	<0.0002	<0.0002	0.0010	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0010	0.0010	0.0010
		1/09/2021	0089_SD368_210901	EP2110157	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006	0.0006
		17/04/2018	0089_SD369_180417	209522	<0.0001	<0.0001	<0.0001	<0.0001	0.0004	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		9/01/2020	0089_SD369_0.40-0.50_200109	EP2000249	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006	0.0006
		31/03/2020	0089_SD369_0.40-0.50_200331	EP2003371	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0025	0.0025
		15/07/2020	0089_SD369_200715	EP2007384	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
WWTP	SD369	24/09/2020	0089_SD369_200924	EP2010272	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006	0.0006
		15/12/2020	0089_SD369_201215	EP2014052	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
		16/03/2021	0089_SD369_210316	EP2102835	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		9/06/2021	0089_SD369_210609	EP2106518	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
		1/09/2021	0089_SD369_210901	EP2110156	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		18/04/2018	0089_SD374_180418	209573	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		8/01/2020	0089_SD374_200109	EP2000187	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		30/03/2020	0089_SD374_0.40-0.50_200330	EP2003314	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
		21/07/2020	0089_SD374_200721	EP2007603	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
Dredge spoil and careening bay	SD374	21/09/2020	0089_SD374_200921	EP2010075	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002	0.0002
		14/12/2020	0089_SD374_201214	EP2013990	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		15/03/2021	0089_SD374_210315	EP2102757	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		10/06/2021	0089_SD374_210610	EP2106581	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
		1/09/2021	0089_SD374_210901	EP2110156	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		18/04/2018	0089_SD375_180418	209573	<0.0001	<0.0001	<0.0001	<0.0001	0.0012	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		8/01/2020	0089_SD375_200109	EP2000187	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006	0.0006
		30/03/2020	0089_SD375_0.30-0.40_200330	EP2003314	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002	0.0002
		21/07/2020	0089_SD375_200721	EP2007603	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
Dredge spoil and careening bay	SD375	21/09/2020	0089_SD375_200921	EP2010075	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
		14/12/2020	0089_SD375_0.30_201214	EP2013990	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		15/03/2021	0089_SD375_210315	EP2102757	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002	0.0002
		10/06/2021	0089_SD375_210610	EP2106581	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
		1/09/2021	0089_SD375_210901	EP2110156	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
		17/04/2018	0089_SD378_180417	209522	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		8/01/2020	0089_SD378_200109	EP2000187	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
		30/03/2020	0089_SD378_0.30-0.40_200330	EP2003314	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
		21/07/2020	0089_SD378_200721	EP2007603	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
Dredge spoil and careening bay	SD378	21/09/2020	0089_SD378_200921	EP2010075	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		14/12/2020	0089_SD378_201214	EP2013990	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		15/03/2021	0089_SD378_210315	EP2102757	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		10/06/2021	0089_SD378_210610	EP2106581	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		1/09/2021	0089_SD378_210901	EP2110156	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0005	0.0005
		19/04/2018	0089_SD380_180419	209623	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		30/01/2020	0089_SD380_200130	EP2001005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		2/04/2020	0089_-SD380_0.80-0.90_200402	EP2003475	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
WWTP	SD380	21/07/2020	0089_SD380_200721	EP2007603	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		23/09/2020	0089_SD380_200923	EP2010219	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0002	0.0002	0.0002
		16/12/2020	0089_SD380_201216	EP2014091	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		17/03/2021	0089_SD380_210317	EP2102888	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		8/06/2021	0089_SD380_210608	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
		30/08/2021	0089_SD380_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		19/04/2018	0089_SD381_180419	209623	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
		30/01/2020	0089_SD381_200130	EP2001005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		2/04/2020	0089_SD381_0.80-0.90_200402	EP2003475	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
WWTP	SD381	21/07/2020	0089_SD381_200721	EP2007596	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		23/09/2020	0089_SD381_200923	EP2010219	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		16/12/2020	0089_SD381_201216	EP2014091	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		17/03/2021	0089_SD381_210317	EP2102888	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		8/06/2021	0089_SD381_210608	EP2106466	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
		30/08/2021	0089_SD381_210830	EP2110018	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.

Table 4 - Sediment Analytical Results

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0005	0.0001	0.0001	0.0001	0.0001	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure					*1*						*10*																				
PFAS NEMP 2020 Ecological indirect exposure					0.01																										
PFAS NEMP 2020 Industrial/ commercial (HIL D)											**50**																			**20**		

Monitoring Area **Location Code** **Date** **Field ID** **Lab Report Number**

New exceedance of guideline value

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Ecological direct exposure

HEPA, January 2020, PFAS NEMP 2020 Ecological indirect exposure

HEPA, January 2020, PFAS NEMP 2020 Industrial/ commercial (HIL D)

Gauging Date	Time	Location Code	Bore Depth (m)	SWL (bTOC)	TOC Elevation (mAHD)	RWL (mAHD)	Other Observations on Bore/Site
16/12/2020	11:38	MW010	9.2	4.71	4.859	0.149	
18/03/2021	09:54	MW010	5.75	4.56	4.859	0.299	
9/06/2021	10:44	MW010	9.2	4.535	4.859	0.324	
31/08/2021	12:24	MW010	9.2	4.635	4.859	0.224	
16/12/2019	13:29	MW109	6.01	4.195	4.446	0.251	
30/03/2020	12:06	MW109		4.101	4.446	0.345	
15/07/2020		MW109		3.885	4.446	0.561	
21/09/2020	08:22	MW109	5.439	4.151	4.446	0.295	
14/12/2020	10:52	MW109	4.44	4.115	4.446	0.331	
16/03/2021	10:03	MW109	5.44	4.022	4.446	0.424	
8/06/2021	10:22	MW109	5.5	4.03	4.446	0.416	
30/08/2021	09:12	MW109	5.5	4.12	4.446	0.326	
8/01/2020	08:06	MW112	5.85	3.61	3.973	0.363	
30/03/2020	10:57	MW112		3.46	3.973	0.513	
15/07/2020		MW112		3.315	3.973	0.658	
21/09/2020	08:37	MW112	5.745	3.456	3.973	0.517	
14/12/2020	11:12	MW112	4.74	3.46	3.973	0.513	
16/03/2021	09:49	MW112	5.73	3.435	3.973	0.538	
8/06/2021	09:36	MW112	6	3.96	3.973	0.013	
30/08/2021	09:57	MW112	6	3.46	3.973	0.513	
16/12/2019	14:02	MW117	6.38	3.43	3.762	0.332	
30/03/2020	10:19	MW117		3.33	3.762	0.432	
15/07/2020		MW117		3.12	3.762	0.642	
21/09/2020	09:29	MW117	5.059	3.373	3.762	0.389	
14/12/2020	11:31	MW117	6.18	3.32	3.762	0.442	
16/03/2021	09:01	MW117	4.98	3.28	3.762	0.482	
8/06/2021	10:08	MW117	6	3.24	3.762	0.522	
30/08/2021	09:43	MW117	6	3.47	3.762	0.292	
16/12/2019	14:02	MW120	6.01	4.13	4.409	0.279	
30/03/2020	11:16	MW120		4.024	4.409	0.385	
15/07/2020		MW120		3.82	4.409	0.589	
21/09/2020	08:50	MW120	5.154		4.409		Dry
14/12/2020	11:26	MW120	4.88	4.04	4.409	0.369	
16/03/2021	10:13	MW120	5.92	3.42	4.409	0.989	Cloudy
8/06/2021	09:30	MW120	5.5	3.96	4.409	0.449	
30/08/2021	10:07	MW120	5.5	4.06	4.409	0.349	
16/12/2019	13:17	MW121	4.84	3.42	3.7	0.28	
30/03/2020	11:32	MW121		4.29	3.7	-0.59	
15/07/2020		MW121		3.165	3.7	0.535	
21/09/2020	09:01	MW121	3.685	3.356	3.7	0.344	
14/12/2020	11:20	MW121	4.72	3.4	3.7	0.3	
16/03/2021	09:41	MW121	4.2		3.7		
8/06/2021	08:44	MW121	5.7	3.25	3.7	0.45	
30/08/2021	08:37	MW121	5.7	4.275	3.7	-0.575	
16/12/2019	13:37	MW123	7.17	6.39	6.62	0.23	
30/03/2020	12:01	MW123	6.48		6.62		Dry
15/07/2020		MW123			6.62		DRY
21/09/2020	09:23	MW123	6.504		6.62		Dry
14/12/2020	10:52	MW123	7.2	6.27	6.62	0.35	
16/03/2021	08:59	MW123	6.8	6.22	6.62	0.4	
8/06/2021	09:11	MW123	8	6.18	6.62	0.44	
30/08/2021	08:51	MW123	8	6.265	6.62	0.355	
9/01/2020	11:21	MW124	4.55	1.992	1.899	-0.093	
30/03/2020	12:49	MW124		1.676	1.899	0.223	
15/07/2020		MW124		1.46	1.899	0.439	
22/09/2020	09:21	MW124	4.39	1.893	1.899	0.006	
14/12/2020	08:29	MW124	3.2	1.79	1.899	0.109	
15/03/2021	09:35	MW124	4.3	1.635	1.899	0.264	
8/06/2021	11:07	MW124	4	1.63	1.899	0.269	
30/08/2021	08:51	MW124	4	1.78	1.899	0.119	
9/01/2020	12:43	MW125	4.43	1.97	1.882	-0.088	
30/03/2020	14:26	MW125		1.82	1.882	0.062	
15/07/2020		MW125		1.44	1.882	0.442	
22/09/2020	09:57	MW125	3.332	1.868	1.882	0.014	
14/12/2020	08:46	MW125	3.25	1.76	1.882	0.122	
15/03/2021	10:40	MW125	4.3	1.73	1.882	0.152	
8/06/2021	11:19	MW125	3.9	1.63	1.882	0.252	
30/08/2021	09:10	MW125	3.9	1.77	1.882	0.112	
8/01/2020	15:29	MW126	4.47	1.73	1.948	0.218	
31/03/2020	08:30	MW126		1.866	1.948	0.082	
15/07/2020		MW126		1.54	1.948	0.408	
22/09/2020	11:01	MW126	4.368	1.913	1.948	0.035	
14/12/2020	08:57	MW126	3.375	1.79	1.948	0.158	
15/03/2021	10:05	MW126	3.325	1.825	1.948	0.123	
8/06/2021	11:30	MW126	3.9	1.67	1.948	0.278	
30/08/2021	09:27	MW126	3.9	1.79	1.948	0.158	
8/01/2020	14:36	MW127	4.45	1.77	1.771	0.001	
31/03/2020	11:07	MW127		1.505	1.771	0.266	
15/07/2020		MW127		1.36	1.771	0.411	
22/09/2020	11:55	MW127	4.319	1.721	1.771	0.05	
14/12/2020	09:15	MW127	3.33	1.615	1.771	0.156	
15/03/2021	09:44	MW127	4.3	1.63	1.771	0.141	
8/06/2021	11:44	MW127	3.9	1.505	1.771	0.266	
30/08/2021	09:40	MW127	3.9	1.59	1.771	0.181	
16/12/2019	13:20	MW128	3.73		4.537		Dry
30/03/2020	12:25	MW128	3.845		4.537		Dry
15/07/2020		MW128			4.537		DRY
21/09/2020	10:00	MW128	3.739		4.537		Dry
14/12/2020	11:44	MW128	5.5				DRY
16/03/2021	10:27	MW128					DRY
8/06/2021	10:45	MW128	5.5	3.69	4.537	0.847	Dry at 3.7
30/08/2021	10:31	MW128	5.5		4.537		Dry
8/01/2020	11:41	MW137	4.5	2.07	2.058	-0.012	
30/03/2020	11:54	MW137		1.856	2.058	0.202	
20/07/2020		MW137		1.54	2.058	0.518	
23/09/2020	08:14	MW137	4.011	1.998	2.058	0.06	
14/12/2020	10:16	MW137	3.9	1.89	2.058	0.168	
16/03/2021	11:08	MW137		1.78	2.058	0.278	
8/06/2021	11:49	MW137	3.9	1.765	2.058	0.293	
30/08/2021		MW137	3.9		2.058		Dry
8/01/2020	08:57	MW139	4.86	2.22	2.273	0.053	
30/03/2020	09:13	MW139		2.034	2.273		
20/07/2020		MW139		1.82	2.273		
22/09/2020	13:07	MW139	3.773	2.041	2.273	0.232	
14/12/2020	08:29	MW139	5	2.05	2.273	0.223	
16/03/2021	09:08	MW139		2	2.273	0.273	
8/06/2021	08:59	MW139	5	1.884	2.273	0.389	
31/08/2021	09:51	MW139	5	1.975	2.273	0.298	
8/01/2020	09:52	MW141	5.36	2.98	3.025	0.045	
30/03/2020	09:48	MW141		2.806	3.025		
20/07/2020		MW141		2.655	3.025		
23/09/2020	08:37	MW141	5.239	2.859	3.025	0.166	
14/12/2020	11:30	MW141	5	2.78	3.025	0.245	
16/03/2021	11:42	MW141		2.76	3.025	0.265	
8/06/2021	12:17	MW141	5	1.673	3.025	1.352	
31/08/2021	10:05	MW141	5	2.725	3.025	0.3	
8/01/2020	11:19	MW142	4	2.13	2.573	0.443	

Gauging Date	Time	Location Code	Bore Depth (m)	SWL (bTOC)	TOC Elevation (mAHD)	RWL (mAHD)	Other Observations on Bore/Site
30/03/2020	11:26	MW142		2.391	2.573		
20/07/2020		MW142		2.18	2.573		
23/09/2020	08:02	MW142	3.845	2.463	2.573	0.11	
14/12/2020	10:48	MW142	4	2.36	2.573	0.213	
16/03/2021	10:58	MW142		2.32	2.573	0.253	
8/06/2021	11:09	MW142	4	2.275	2.573	0.298	
30/08/2021	11:28	MW142	4	2.338	2.573	0.235	
8/01/2020		MW147	3.2		3.423		Dry
30/03/2020	10:22	MW147	3.008		3.423		Bore dry - no sample able to be taken
20/07/2020		MW147		2.91	3.423	0.513	
23/09/2020	08:33	MW147	3.174		3.423		Dry
14/12/2020	11:33	MW147	5.2				Dry
16/03/2021	11:42	MW147			3.423		Dry
8/06/2021	12:13	MW147					DRY
30/08/2021	12:38	MW147	5.2		3.423		Dry
8/01/2020	11:00	MW149	4.76	2.29	2.303	0.013	
30/03/2020	10:43	MW149		2.094	2.303		
20/07/2020		MW149		1.87	2.303		
23/09/2020	08:03	MW149		2.2	2.303	0.103	
14/12/2020	09:18	MW149	4	2.08	2.303	0.223	
16/03/2021	09:53	MW149		2.06	2.303	0.243	
8/06/2021	10:04	MW149	4	1.975	2.303	0.328	
30/08/2021	11:47	MW149	4	2.066	2.303	0.237	
8/01/2020	14:54	MW158	15.87	14.34	14.541	0.201	
31/03/2020	14:58	MW158		14.18	14.541	0.361	
21/07/2020		MW158		14.125	14.541	0.416	
21/09/2020	11:44	MW158		14.123	14.541	0.418	
14/12/2020	12:02	MW158	14.78	14.14	14.541	0.401	
15/03/2021	11:26	MW158	14.85		14.541		Dipper wasn't Working
10/06/2021	13:48	MW158	15.82	13.991	14.541	0.55	
30/08/2021	11:49	MW158	15.82	14.58	14.541	-0.039	QC110/210
8/01/2020	15:37	MW161	18.97	16.97	17.225	0.255	
21/07/2020		MW161		16.62	17.225	0.605	
21/09/2020	12:54	MW161		16.528	17.225	0.697	
14/12/2020	12:17	MW161	18.2	16.77	17.225	0.455	
15/03/2021	11:28	MW161	18.29	16.7	17.225	0.525	
10/06/2021	14:24	MW161	18.13	16.655	17.225	0.57	
30/08/2021	12:40	MW161	18.13	14.6	17.225	2.625	
8/01/2020	20:11	MW166	12.34	11.42	11.89	0.47	
1/04/2020	08:18	MW166		11.26	11.89	0.63	
21/07/2020		MW166		11.195	11.89	0.695	
22/09/2020	08:56	MW166	12.52	11.294	11.89	0.596	
14/12/2020	12:38	MW166	11.4	11.28	11.89	0.61	Hand bailed. Not enough water for hydrasleeve
15/03/2021	12:47	MW166	12.53	11.295	11.89	0.595	Mislabelled in COC as 127
10/06/2021	14:41	MW166	13	12.09	11.89	-0.2	
30/08/2021	12:42	MW166	13	11.75	11.89	0.14	
1/04/2020	08:46	MW171		28.55	29.238	0.688	
21/07/2020		MW171		28.48	29.238	0.758	
22/09/2020	07:57	MW171	29.376		29.238		Dry
14/12/2020	12:36	MW171	36.2	28.55	29.238	0.688	
15/03/2021	11:53	MW171	34.945	28.55	29.238	0.688	
10/06/2021	14:27	MW171	31.5	28.392	29.238	0.846	
30/08/2021	12:44	MW171	31.5	28.6	29.238	0.638	
9/01/2020	10:31	MW172	8.93		16.772		Dry
1/04/2020	09:35	MW172	8.91		16.772		Dry
21/07/2020		MW172			16.772		DRY
22/09/2020	08:26	MW172	9.113		16.772		Dry
14/12/2020	14:11	MW172	16.45				DRY
15/03/2021	12:46	MW172					Dry
10/06/2021	14:26	MW172	26		16.772		Dry
30/08/2021	13:02	MW172	26		16.772		Dry
16/01/2020	12:18	MW173	11.6	8.8	10.08	1.28	
31/03/2020	14:05	MW173		9.4	10.08	0.68	
22/07/2020		MW173		9.53	10.08	0.55	
22/09/2020	11:25	MW173			10.08		DRY
16/12/2020	09:09	MW173	9.585				DRY
16/03/2021	11:59	MW173	11.47	9.595	10.08	0.485	Bailer used due to shallow water
10/06/2021	14:11	MW173	11.11	9.471	10.08	0.609	
30/08/2021	17:39	MW173	11.11		10.08		Dry
8/01/2020	11:23	MW193	13.13	11.4	11.86	0.46	
31/03/2020	14:19	MW193		11.19	11.86	0.67	
15/07/2020		MW193		11.1	11.86	0.76	
21/09/2020	11:11	MW193	11.278		11.86		Dry
16/12/2020	09:14	MW193	11.89	11.3	11.86	0.56	
16/03/2021	11:56	MW193	12.1	11.8	11.86	0.06	Hand bailed
10/06/2021	14:20	MW193	13.5	11.13	11.86	0.73	
30/08/2021	14:32	MW193	13.5	11.31	11.86	0.55	QC113/213
16/03/2021	12:33	MW195D	17.76	4.17	4.363	0.193	QC115, QC215
9/06/2021	10:57	MW195D	13	4.055	4.363	0.308	Weather rainy and overcast
30/08/2021	13:42	MW195D	13	4.27	4.363	0.093	QC111/211
8/01/2020	09:04	MW195-D	18.1	4.34	4.363	0.023	
31/03/2020	13:40	MW195-D		4.184	4.363	0.179	
15/07/2020		MW195-D		4	4.363	0.363	
21/09/2020	10:18	MW195-D	7.546	4.234	4.363	0.129	
16/12/2020	09:37	MW195-D	17.8	4.23	4.363	0.133	
16/03/2021	12:28	MW195S	7.93	3.8	4.571	0.771	
9/06/2021	11:06	MW195S	6.5	4.055	4.571	0.516	
30/08/2021	14:19	MW195S	6.5	4.17	4.571	0.401	
8/01/2020	10:17	MW195-S	8.8	4.31	4.571	0.261	
31/03/2020	13:24	MW195-S		4.16	4.571	0.411	
15/07/2020		MW195-S		4	4.571	0.571	
21/09/2020	10:32	MW195-S	6.473	4.186	4.571	0.385	
16/12/2020	09:30	MW195-S	6.455	4.185	4.571	0.386	
16/01/2020	13:12	MW196	14.6	13.9	12.75	-1.15	
2/04/2020	08:43	MW196	13.595	12.504	12.75	0.246	
22/07/2020		MW196		12.4	12.75	0.35	
24/09/2020	08:50	MW196	13.645	12.535	12.75	0.215	
16/12/2020	08:12	MW196	13.4	12.5	12.75	0.25	
16/03/2021	13:33	MW196	12.82		12.75		DRY
10/06/2021	14:00	MW196	13.8	12.36	12.75	0.39	
30/08/2021	13:59	MW196	13.8	12.44	12.75	0.31	
9/01/2020		MW197	2.85	2.43	2.28	-0.15	
31/03/2020	12:43	MW197		2.1	2.28	0.18	
15/07/2020		MW197		1.93	2.28	0.35	
24/09/2020	10:10	MW197	2.685		2.28		Dry
15/12/2020	13:39	MW197	2.85				Dry
16/03/2021	11:17	MW197	2.67	2.015	2.28	0.265	
9/06/2021	08:55	MW197	NA	1.91	2.28	0.37	
1/09/2021	09:39	MW197		2.001	2.28	0.279	
8/01/2020	11:38	MW199	12.8	11.4	11.8	0.4	
31/03/2020	12:47	MW199		8.65	11.8	3.15	
15/07/2020		MW199		11.14	11.8	0.66	
21/09/2020	07:42	MW199	16.1	11.474	11.8	0.326	
16/12/2020	09:54	MW199	12.525	11.27	11.8	0.53	
16/03/2021	12:05	MW199		11.38	11.8	0.42	blocked less than 1 metre
9/06/2021	08:34	MW199	NA	10.34	11.8	1.46	Well bent at approx 1.5m, unable to fix with steel bailer
30/08/2021	14:30	MW199	NA	11.26	11.8	0.54	

Gauging Date	Time	Location Code	Bore Depth (m)	SWL (bTOC)	TOC Elevation (mAHD)	RWL (mAHD)	Other Observations on Bore/Site
9/01/2020	13:41	MW200	2.53	1.98	2.07	0.09	
31/03/2020	12:02	MW200		1.67	2.07	0.4	
15/07/2020		MW200		1.84	2.07	0.23	
24/09/2020	10:30	MW200	2.689	1.125	2.07	0.945	
15/12/2020	13:26	MW200	2.53	2.07	2.07	0	
16/03/2021	10:55	MW200	2.69	1.82	2.07	0.25	
9/06/2021	09:03	MW200	NA	1.675	2.07	0.395	
1/09/2021	10:00	MW200		1.856	2.07	0.214	
17/01/2020		MW202					Not found
31/03/2020	15:34	MW202		1.71	2.12	0.41	
22/07/2020		MW202		1.62	2.12	0.5	
21/09/2020	13:58	MW202		1.92	2.12	0.2	
16/12/2020	10:32	MW202	2.875	1.95	2.12	0.17	
15/03/2021	10:13	MW202		1.82	2.12	0.3	
10/06/2021	12:21	MW202	NA	1.385	2.12	0.735	
30/08/2021	15:33	MW202	NA	1.85	2.12	0.27	
8/01/2020	14:33	MW203	12.93	10.73	10.855	0.125	
31/03/2020	13:31	MW203		10.61	10.855	0.245	
15/07/2020		MW203		10.42	10.855	0.435	
22/09/2020	08:12	MW203		10.56	10.855	0.295	
16/12/2020	10:17	MW203	11.79	10.605	10.855	0.25	
16/03/2021	13:14	MW203		10.52	10.855	0.335	
9/06/2021	11:45	MW203	12.9	10.44	10.855	0.415	
30/08/2021	14:49	MW203	12.9	10.43	10.855	0.425	
10/01/2020		MW214			8.075		Dry
31/03/2020	12:34	MW214			8.075		Bore Dry
22/07/2020		MW214			8.075		Dry
24/09/2020	09:44	MW214	7.631		8.075		Dry
15/12/2020	10:26	MW214	6.93				DRY
18/03/2021	09:48	MW214					Dry
9/06/2021	14:01	MW214	9		8.075		Dry
1/09/2021	13:49	MW214	9	7.64	8.075	0.435	Bore blocked by fine sedimend. Unblocked.
10/01/2020		MW215	3.05		3.794		Dry
31/03/2020	12:46	MW215			3.794		Bore Dry
22/07/2020		MW215		3.37	3.794		Dry
24/09/2020	09:36	MW215	3.487		3.794		Dry
15/12/2020	11:06	MW215	4.5				Dry
18/03/2021	09:50	MW215					Dry
9/06/2021	13:55	MW215	4.5		3.794		Dry at 3.11
1/09/2021	13:08	MW215	4.5	3.416	3.794	0.378	Blockage cleared with steel bailer
19/12/2019	09:40	MW216	9.6	7.9	8.329	0.429	
31/03/2020	12:12	MW216		7.905	8.329	0.424	
22/07/2020		MW216			8.329		
24/09/2020	09:35	MW216	7.596		8.329		Dry
15/12/2020	09:55	MW216	9.5	7.91	8.329	0.419	
18/03/2021	09:38	MW216		8.93	8.329	-0.601	
9/06/2021	13:38	MW216	6	7.752	8.329	0.577	
31/08/2021	10:54	MW216	9	7.909	8.329	0.42	
18/12/2019	13:30	MW217	10.1	8.49	8.847	0.357	
31/03/2020	10:32	MW217		8.438	8.847	0.409	
22/07/2020		MW217		8.31	8.847	0.537	
24/09/2020	08:48	MW217	10.066	8.458	8.847	0.389	
15/12/2020	08:51	MW217	9.975	8.42	8.847	0.427	
18/03/2021	08:40	MW217		8.43	8.847	0.417	
9/06/2021	12:42	MW217	9.5	8.28	8.847	0.567	
31/08/2021	08:48	MW217	9.5	8.355	8.847	0.492	
18/12/2019	13:57	MW220	6.6				Historical bore - no log available/Need survey
31/03/2020	11:48	MW220					Bore Dry
22/07/2020		MW220	6.52				Blocked could not sample
24/09/2020	08:59	MW220	6.791				Dry
15/12/2020	09:03	MW220	6.68				DRY
18/03/2021	08:46	MW220					Dry
9/06/2021	12:50	MW220	NA	6.545	NA		Only PFAS Sample collected. not enough water
31/08/2021	09:34	MW220	NA		NA		Dry
18/12/2019	14:06	MW224	14.6	13.13	13.372	0.242	
31/03/2020	11:24	MW224		13.043	13.372	0.329	
22/07/2020		MW224		12.89	13.372	0.482	
24/09/2020	09:05	MW224	14.576	13.011	13.372	0.361	
15/12/2020	09:12	MW224	13.38	13.06	13.372	0.312	
18/03/2021	08:55	MW224		12.95	13.372	0.422	
9/06/2021	13:02	MW224	14.25	12.88	13.372	0.492	
31/08/2021	09:04	MW224	14.25	12.9	13.372	0.472	
10/01/2020		MW225	3.44		4.066		Dry
31/03/2020	12:53	MW225			4.066		Bore Dry
22/07/2020		MW225			4.066		DRY
24/09/2020	09:41	MW225	3.55		4.066		DRY
15/12/2020	09:44	MW225	5				Dry
17/03/2021	12:32	MW225					Dry
9/06/2021	12:46	MW225	5		4.066		Dry
1/09/2021	12:47	MW225	5	3.85	4.066	0.216	Well blocked by fine sediment/sand. Unblocked and sampled with bailer
14/01/2020	12:20	MW226	4.33	1.9	1.749	-0.151	
2/04/2020	12:17	MW226		1.611	1.749	0.138	
21/07/2020		MW226		1.49	1.749	0.259	
22/09/2020	08:29	MW226		1.7	1.749	0.049	
15/12/2020	09:38	MW226	4.2	1.72	1.749	0.029	
17/03/2021	13:00	MW226	3.22	1.415	1.749	0.334	
10/06/2021	08:41	MW226	3.8	1.1	1.749	0.649	
31/08/2021	14:32	MW226	3.8	1.716	1.749	0.033	
17/01/2020		MW227			2.961		Not found
1/04/2020	13:09	MW227		2.795	2.961	0.166	
22/07/2020		MW227		2.705	2.961	0.256	
21/09/2020	12:43	MW227		2.77	2.961	0.191	
15/12/2020	08:42	MW227	4.2	2.78	2.961	0.181	
15/03/2021	13:40	MW227	4.1	2.8	2.961	0.161	
10/06/2021	15:44	MW227	4.2	2.488	2.961	0.473	
31/08/2021	13:57	MW227	3.75	2.807	2.961	0.154	
14/01/2020	13:12	MW228			2.23		
1/04/2020	10:57	MW228		2.082	2.23	0.148	
22/07/2020		MW228		1.98	2.23	0.25	
21/09/2020	11:33	MW228		3.075	2.23	-0.845	
15/12/2020	08:29	MW228	3.75	2.065	2.23	0.165	
15/03/2021	13:16	MW228	4.06	2.08	2.23	0.15	
10/06/2021	09:58	MW228	3.75	1.675	2.23	0.555	
31/08/2021	13:41	MW228	4.968	2.086	2.23	0.144	
8/01/2020	14:38	MW233	5.56	3.51	3.705	0.195	
30/03/2020	14:30	MW233		3.38	3.705	0.325	
15/07/2020		MW233		2.9	3.705	0.805	
21/09/2020	08:00	MW233		3.045	3.705	0.66	
15/12/2020	08:10	MW233	3.85	3.36	3.705	0.345	
15/03/2021	12:06	MW233		3.18	3.705	0.525	
9/06/2021	08:57	MW233	4.968	2.923	3.705	0.782	
30/08/2021	08:58	MW233	4.968	2.794	3.705	0.911	
16/01/2020		MW236	4.8	4.3	4.642	0.342	
2/04/2020	11:32	MW236	5.058	4.176	4.642	0.466	
16/07/2020		MW236		4	4.642	0.642	
21/09/2020	08:35	MW236		4.14	4.642	0.502	

Gauging Date	Time	Location Code	Bore Depth (m)	SWL (bTOC)	TOC Elevation (mAHD)	RWL (mAHD)	Other Observations on Bore/Site
15/12/2020	10:38	MW236	4.98	4.18	4.642	0.462	
16/03/2021	13:45	MW236	4.97	4.08	4.642	0.562	
10/06/2021	10:38	MW236	5.66	4.01	4.642	0.632	
31/08/2021	08:45	MW236	5.66	3.95	4.642	0.692	
14/01/2020	14:17	MW238	7.2	4	4.827	0.827	
1/04/2020	11:57	MW238		4.38	4.827	0.447	
16/07/2020		MW238		4.315	4.827	0.512	
21/09/2020	10:00	MW238		4.39	4.827	0.437	
15/12/2020	12:04	MW238	5.96	4.505	4.827	0.322	
18/03/2021	12:41	MW238		4.45	4.827	0.377	
10/06/2021	10:24	MW238		4.29	4.827	0.537	
31/08/2021	10:43	MW238	NA	3.975	4.827	0.852	
14/01/2020		MW239	3.4		4.03		Dry
1/04/2020	12:16	MW239	3.08		4.03		Bore dry
22/07/2020		MW239		3.505	4.03	0.525	Bore is damaged/bent.
21/09/2020	10:13	MW239		3.59	4.03	0.44	
15/12/2020	12:30	MW239	6.275	3.725	4.03	0.305	
18/03/2021	12:45	MW239	6.37	3.63	4.03	0.4	
10/06/2021	10:17	MW239		3.511	4.03	0.519	
31/08/2021	10:53	MW239	NA	3.26	4.03	0.77	
14/01/2020	14:39	MW240	7.33	2.7	4.483	1.783	
1/04/2020	11:37	MW240		4.18	4.483	0.303	
16/07/2020		MW240		3.99	4.483	0.493	
21/09/2020	09:37	MW240		4.035	4.483	0.448	
15/12/2020	11:51	MW240	5.68	4.19	4.483	0.293	
18/03/2021	12:33	MW240	5.8	4.7	4.483	-0.217	
10/06/2021	09:35	MW240	6.8	3.94	4.483	0.543	
31/08/2021	10:26	MW240	6.8	3.67	4.483	0.813	
8/01/2020	09:49	MW242	4.72	3.359	3.539	0.18	
30/03/2020	08:28	MW242		3.934	3.539	-0.395	
16/07/2020		MW242		3.025	3.539	0.514	
21/09/2020	08:58	MW242		3.125	3.539	0.414	
15/12/2020	13:04	MW242	3.605	3.265	3.539	0.274	
18/03/2021	08:29	MW242	4.73	3.43	3.539	0.109	
9/06/2021	09:24	MW242	4.76	3.03	3.539	0.509	
31/08/2021	11:47	MW242	4.76	2.755	3.539	0.784	
14/01/2020	15:16	MW243	6.57	4.63	4.892	0.262	
1/04/2020	12:45	MW243		4.6	4.892	0.292	
16/07/2020		MW243		4.39	4.892	0.502	
21/09/2020	09:23	MW243		4.47	4.892	0.422	
15/12/2020	11:36	MW243	6.16	4.57	4.892	0.322	
18/03/2021	12:32	MW243	7.3	4.5	4.892	0.392	
10/06/2021	09:34	MW243		4.366	4.892	0.526	
31/08/2021	10:12	MW243	7	4.135	4.892	0.757	
14/01/2020	15:12	MW245	6.37	4.8	4.551	0.431	
1/04/2020	12:33	MW245		4.28	4.551	0.431	
16/07/2020		MW245		3.985	4.551	0.431	
21/09/2020	10:35	MW245		4.12	4.551	0.431	
15/12/2020	12:48	MW245	5.265	4.235	4.551	0.316	
18/03/2021	12:47	MW245		4.17	4.551	0.381	
10/06/2021	10:10	MW245	5.65	3.98	4.551	0.571	
31/08/2021	11:05	MW245	5.65	3.79	4.551	0.761	
17/01/2020		MW247					Not found
8/01/2020	10:05	MW248	5.9	3.97	4.073	0.103	
1/04/2020	13:37	MW248		3.83	4.073	0.243	
22/07/2020		MW248		3.73	4.073	0.343	
21/09/2020	11:51	MW248	4.73	3.86	4.073	0.213	
15/12/2020	13:45	MW248	4.735	3.865	4.073	0.208	
18/03/2021	08:44	MW248	4.75	3.78	4.073	0.293	
9/06/2021	10:05	MW248	NA	3.745	4.073	0.328	
31/08/2021	13:09	MW248	NA	3.81	4.073	0.263	Dry
8/01/2020	14:32	MW249	7.17	5.14	5.227	0.087	
30/03/2020	08:51	MW249		5.036	5.227	0.191	
16/07/2020		MW249		4.8	5.227	0.427	
21/09/2020	11:02	MW249	6.15	4.885	5.227	0.342	
15/12/2020	13:23	MW249	5.07	5.015	5.227	0.212	
15/03/2021	12:21	MW249		4.93	5.227	0.297	
9/06/2021	09:23	MW249		4.973	5.227	0.254	
31/08/2021	09:11	MW249	6.5	4.57	5.227	0.657	
8/01/2020		MW250			4.657		Not found
19/12/2019	14:06	MW255	4.22		4.609		Dry
2/04/2020	10:12	MW255	4.295		4.609		BORE DRY
16/07/2020		MW255		4.015	4.609		
22/09/2020	09:08	MW255		4.1	4.609	0.509	
16/12/2020	11:38	MW255	6	4.18	4.609	0.429	
17/03/2021	13:35	MW255	6.36	4.1	4.609	0.509	
10/06/2021	08:52	MW255	6	4.03	4.609	0.579	
31/08/2021	09:25	MW255	6	3.99	4.609	0.619	Murky
8/01/2020		MW256	5.78	3.56	3.84	0.28	Root blockage at 3m could not sample
30/03/2020	13:28	MW256		3.418	3.84	0.422	
16/07/2020		MW256		3.24	3.84	0.6	
22/09/2020	08:42	MW256		3.34	3.84	0.5	
14/12/2020	13:52	MW256	6	3.4	3.84	0.44	
17/03/2021	13:31	MW256	5.565	3.345	3.84	0.495	
10/06/2021	08:29	MW256		3.225	3.835	0.61	
31/08/2021	10:27	MW256	6	3.2	3.84	0.64	
19/12/2019	13:56	MW257	5.47	3.47	3.806	0.336	
2/04/2020	09:36	MW257		3.416	3.806	0.39	
16/07/2020		MW257		3.245	3.806	0.561	
22/09/2020	12:23	MW257		3.37	3.806	0.436	
16/12/2020	11:20	MW257	5.7	3.39	3.806	0.416	
18/03/2021	09:11	MW257	5.26	3.82	3.806	-0.014	
9/06/2021	11:31	MW257	5.7	5.268	3.806	-1.462	
31/08/2021	09:54	MW257	5.7	3.225	3.806	0.581	
19/12/2019	13:44	MW258	3.25		4.043		Dry
2/04/2020	09:55	MW258	3.305		4.043		BORE DRY
16/07/2020		MW258			4.043		DRY
22/09/2020	12:41	MW258			4.043		Dry. Bore appears to be blocked (tree roots)
16/12/2020	11:06	MW258	6				Dry
18/03/2021	09:20	MW258	3.59				Dry. Potentially blocked by tree roots
10/06/2021	09:18	MW258					DRY
31/08/2021	10:22	MW258	6		4.043		Dry
19/12/2019	13:31	MW259	3.47		3.8		Dry
2/04/2020	10:01	MW259	5.201	3.321	3.8	0.479	OBSTRUCTION IN BORE AT 3.4M
16/07/2020		MW259		3.215	3.8	0.585	
22/09/2020	12:07	MW259		3.39	3.8	0.41	
16/12/2020	11:11	MW259	4	3.34	3.8	0.46	
18/03/2021	09:24	MW259	5	3.32	3.8	0.48	
10/06/2021	09:46	MW259	5.5	3.22	3.8	0.58	
31/08/2021	08:56	MW259	5.5	3.65	3.8	0.15	Roots
17/01/2020		MW260			4.056		Not found
19/12/2019	12:28	MW261	6	3.6	3.858	0.258	
30/03/2020	09:41	MW261		3.609	3.858	0.249	
21/07/2020		MW261		3.55	3.858	0.308	
22/09/2020	13:50	MW261		3.63	3.858	0.228	
16/12/2020	11:33	MW261	4.72	3.6	3.858	0.258	
18/03/2021	10:06	MW261	4.76	3.36	3.858	0.498	

Gauging Date	Time	Location Code	Bore Depth (m)	SWL (bTOC)	TOC Elevation (mAHD)	RWL (mAHD)	Other Observations on Bore/Site
9/06/2021	10:13	MW261	6	3.459	3.858	0.399	
31/08/2021	12:39	MW261	6	3.5	3.858	0.358	
17/01/2020		MW262			3.767		Bore destroyed
19/12/2019	13:07	MW264	6.75	4.52	4.806	0.286	
30/03/2020	10:49	MW264		4.47	4.806	0.336	
22/09/2020	14:01	MW264		4.49	4.806	0.316	
14/12/2020	13:17	MW264	6	4.45	4.806	0.356	
18/03/2021	09:36	MW264	6.66	4.38	4.806	0.426	
9/06/2021	11:00	MW264	6	4.334	4.806	0.472	
31/08/2021	12:02	MW264	6	4.355	4.806	0.451	
19/12/2019	10:24	MW268	5.85	3.87	4.056	0.186	
30/03/2020	11:12	MW268		3.78	4.056	0.276	
21/09/2020	10:05	MW268		3.03	4.056	1.026	
14/12/2020	12:31	MW268	5.5	2.87	4.056	1.186	
16/03/2021	13:35	MW268		3.75	4.056	0.306	
9/06/2021	11:48	MW268	5.5	3.664	4.056	0.392	
31/08/2021	13:59	MW268	5.5	3.91	4.056	0.146	
19/12/2019	10:52	MW269	6	4	4.153	0.153	
30/03/2020	10:23	MW269		3.97	4.153	0.183	
21/09/2020	10:20	MW269		4.075	4.153	0.078	
14/12/2020	12:41	MW269	5.5	3.98	4.153	0.173	
16/03/2021	13:48	MW269		3.84	4.153	0.313	
9/06/2021	11:27	MW269	5.5	3.738	4.153	0.415	
31/08/2021	14:16	MW269	5.5	4.02	4.153	0.133	
8/01/2020	10:27	MW272	4.53	2.21	2.226	0.016	
30/03/2020	11:07	MW272		2.028	2.226	0.198	
22/09/2020	13:28	MW272	4.346	2.144	2.226	0.082	
14/12/2020	10:19	MW272	3.9	2.05	2.226	0.176	
16/03/2021	10:22	MW272		1.91	2.226	0.316	
8/06/2021	10:43	MW272	3.9	1.511	2.226	0.715	
31/08/2021	10:19	MW272	3.9	2.682	2.226	-0.456	
18/12/2019	14:46	MW282	7.4	5.5	5.881	0.381	
31/03/2020	11:07	MW282		5.412	5.881	0.469	
24/09/2020	09:15	MW282	6.963	5.378	5.881	0.503	
15/12/2020	09:20	MW282	5.97	5.4	5.78	0.38	
18/03/2021	09:07	MW282		8.35			
9/06/2021	13:11	MW282	7.5	5.25	5.78	0.53	
31/08/2021	09:23	MW282	7.5	5.24	5.78	0.54	
8/01/2020	15:16	MW288	3.8		4.003		Dry
1/04/2020	10:39	MW288		3.68	4.003	0.323	
22/09/2020	07:55	MW288			4.003		DRY
15/12/2020	13:09	MW288	5.25				Dry
17/03/2021	12:23	MW288	3.89	3.585	4.003	0.418	
10/06/2021	11:28	MW288	5.25		4.003		Dry
31/08/2021	08:41	MW288	5.25	3.692	4.003	0.311	Blockage cleared with steel bailer
17/01/2020		MW289			4.495		Not found
30/03/2020	14:07	MW289		4.186	4.495		
21/09/2020	07:47	MW289		4.105	4.495	0.39	
15/12/2020	13:23	MW289	6.28	4.28	4.495	0.215	
16/03/2021	12:51	MW289		4.1	4.495	0.395	
9/06/2021	08:59	MW289	6.25	3.94	4.495	0.555	
30/08/2021	09:24	MW289	6.25	3.853	4.495	0.642	
15/07/2020		MW315		3.07			Sampled instead of MW262
2/04/2020	10:30	MW331	4.478	3.863	3.96	0.097	
22/09/2020	13:24	MW331	4.48	4.00	3.96	-0.04	
30/03/2020	09:17	MW516		6.179	6.37	0.191	
21/07/2020		MW516		6.03	6.37	0.34	
21/09/2020	12:21	MW516	8	6.12	6.37	0.25	
16/12/2020	10:56	MW516	6.93	6.155	6.369	0.214	
18/03/2021	08:46	MW516	7	6.29	6.37	0.08	
9/06/2021	10:09	MW516	7.5	6.002	6.37	0.368	
31/08/2021	13:29	MW516	7.5	5.175	6.37	1.195	
30/03/2020	14:51	MW517		4.36	4.77	0.41	
16/07/2020		MW517		4.165	4.77	0.605	
22/09/2020	08:19	MW517		4.25	4.77	0.52	
15/12/2020	08:24	MW517	4.7	4.335	4.769	0.434	
18/03/2021	09:00	MW517	5.6	4.285	4.77	0.485	
9/06/2021	11:11	MW517	6	5.25	4.77	-0.48	
31/08/2021	09:57	MW517	6	3.145	4.77	1.625	
30/03/2020	10:07	MW518		5.29	5.55	0.26	
21/07/2020		MW518		5.2	5.55	0.35	
22/09/2020	12:53	MW518		5.295	5.55	0.255	
16/12/2020	11:20	MW518	6.5	5.25	5.545	0.295	
18/03/2021	09:45	MW518	6.98	5.175	5.55	0.375	
9/06/2021	10:19	MW518	6.5	4.171	5.55	1.379	
31/08/2021	12:49	MW518	6.5	5.175	5.55	0.375	Roots present

Monitoring Date	Monitoring Area	LocationCode	Sample_ID	Observations	QC Dup Sample #	Purge Method	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Odour	Colour
8/01/2020	Accommodation Area	MW288	0089_MW288_200108	Dry		HydroSleeve								
1/04/2020	Accommodation Area	MW288		Less than 5cm of water, could not sample		HydroSleeve								
22/09/2020	Accommodation Area	MW288		DRY		HydroSleeve								
15/12/2020	Accommodation Area	MW288	0089_MW288_201215	Dry		HydroSleeve								Clear
17/03/2021	Accommodation Area	MW288	0089_MW288_210317	shallow water. bailer used		HandBailing	24.4	2.7	1415	923	7.65	-177.5		Clear
10/06/2021	Accommodation Area	MW288		Dry		HydraSleeve								
31/08/2021	Accommodation Area	MW288	0089_MW288_210831	Blockage cleared with steel bailer		Hydrasleeve	20.1	1.09	1178	767	7.83	57.4		Clear
17/01/2020	Accommodation Area	MW289		Not found - Location "unconfirmed" in Esdat										
30/03/2020	Accommodation Area	MW289	0089_MW289_200330			HydroSleeve	22.1	1.6	1212	786.5	7.58	-27.2		Clear
21/09/2020	Accommodation Area	MW289	0089_MW289_200921		QC101, QC201	HydroSleeve	17.6	2.9	815	624	7.38	33.9		Cloudy
15/12/2020	Accommodation Area	MW289	0089_MW289_201215			HydroSleeve	22.8	0.59	1763	1144	7.5	-9.2		Cloudy
16/03/2021	Accommodation Area	MW289	0089_MW289_210316			HydraSleeve	24.1	1.3	1322	871	7.82	27.3		
9/06/2021	Accommodation Area	MW289	0089_MW289_210609			HydraSleeve	19.7	0.94	2432	1581	7.54	-71.8		Clear
30/08/2021	Accommodation Area	MW289	0089_MW289_210830	QC103/203	QC103/203	Hydrasleeve	19.2	2.18	1064	689	7.68	205.7		Clear
8/01/2020	AVCAT Storage and Fuel Farm	MW233	0089_MW233_200108	Tree roots		HydroSleeve								
30/03/2020	AVCAT Storage and Fuel Farm	MW233	0089_MW233_200330			HydroSleeve	17.6	3.1	344	223	8.12	-33.7		
15/07/2020	AVCAT Storage and Fuel Farm	MW233	0089_MW233_200715		QC107,QC207	HydroSleeve	16.5	2.55	272.4		8.28	80.2		Clear
21/09/2020	AVCAT Storage and Fuel Farm	MW233	0089_MW233_200921			HydroSleeve	15.7	2.99	443.9	289.25	7.6	30.6		Cloudy
15/12/2020	AVCAT Storage and Fuel Farm	MW233	0089_MW233_201215			HydroSleeve	17.3	1.65	396.8	302.25	8.28	-118.8		Clear
15/03/2021	AVCAT Storage and Fuel Farm	MW233	0089_MW233_210315		QC104, QC204	HydraSleeve	18.9	2.04	695	455	8.51	-167.4		Clear
9/06/2021	AVCAT Storage and Fuel Farm	MW233	0089_MW233_210609			HydraSleeve	15.7	2.03	419.5	273	7.82	-214.6	slight sulphur	Clear
30/08/2021	AVCAT Storage and Fuel Farm	MW233	0089_MW233_210830	QC102/202	QC102/202	Hydrasleeve	15.6	2.1	442.6	287.95	8.39	190.6		Clear
16/01/2020	AVCAT Storage and Fuel Farm	MW236	0089_MW236_200116	Dry										
2/04/2020	AVCAT Storage and Fuel Farm	MW236	0089_MW236_200402			HandBailing	22.4	5.92	579	335.5	7.62	-137.8		Yellow,Cloudy
16/07/2020	AVCAT Storage and Fuel Farm	MW236	0089_MW236_200716		QC108, QC208	HydroSleeve	18.9	2.8	969		8.01	-10.9		Clear,Brown
21/09/2020	AVCAT Storage and Fuel Farm	MW236	0089_MW236_200921	Water too shallow for hydrasleeve. Bailer used		HandBailing	16.8	3.98	574	442	7.65	-2.4		Clear
15/12/2020	AVCAT Storage and Fuel Farm	MW236	0089_MW236_201215	Hand bailed. Water too shallow for hydrasleeve		HandBailing	21	3.19	616	435.5	7.61	7.5		Clear,Cloudy
16/03/2021	AVCAT Storage and Fuel Farm	MW236	0089_MW236_210316	hand bailed due to shallow water		HandBailing	24.2	2.59	776	507	7.5	97.6		Clear
10/06/2021	AVCAT Storage and Fuel Farm	MW236	0089_MW236_210610			Hand Bailer	21.9	4.12	726	474.5	8.33	45.7		Clear
31/08/2021	AVCAT Storage and Fuel Farm	MW236	0089_MW236_210831			Hydrasleeve	18.5	4.77	776	507	7.57	69.9		Clear
14/01/2020	AVCAT Storage and Fuel Farm	MW238	0089_MW238_200114			HydroSleeve	24.2	19.95	985	650	8.44	-70.2		
1/04/2020	AVCAT Storage and Fuel Farm	MW238	0089_MW238_200401		Qc104/204	HydroSleeve	21.3	1.3	696	455	7.48	-43.9		Clear
16/07/2020	AVCAT Storage and Fuel Farm	MW238	0089_MW238_200716			HydroSleeve	19.8	2.69	776	559	7.85	18.2		Clear,Brown
21/09/2020	AVCAT Storage and Fuel Farm	MW238	0089_MW238_200921			HydroSleeve	18.1	4.64	616	461.5	7.74	31.5		Cloudy,Brown
15/12/2020	AVCAT Storage and Fuel Farm	MW238	0089_MW238_201215		QC114, Q214	HydroSleeve	22	1.51	656	455	7.65	-9.2		Clear,Cloudy
18/03/2021	AVCAT Storage and Fuel Farm	MW238	0089_MW238_210318			HydraSleeve	21.3	1.31	728	474.5	7.74	2.8		Clear
10/06/2021	AVCAT Storage and Fuel Farm	MW238	0089_MW238_210610			HydraSleeve	21.3	2.58	779	507	8.44	18.3		Clear
31/08/2021	AVCAT Storage and Fuel Farm	MW238	0089_MW238_210831			Hydrasleeve	20.4	4.26	665	435.5	7.81	75.4		Clear
14/01/2020	AVCAT Storage and Fuel Farm	MW239	0089_MW239_200114	Dry										
1/04/2020	AVCAT Storage and Fuel Farm	MW239		Bore dry		HydroSleeve								
22/07/2020	AVCAT Storage and Fuel Farm	MW239	0089_MW239_200722	Bore is damaged/bent.		HydroSleeve	17.8	6.11	18786	14150.5		16.3		Clear
21/09/2020	AVCAT Storage and Fuel Farm	MW239	0089_MW239_200921			HydroSleeve	16.7	5.38	561	435.5	7.79	38.5		Cloudy,Brown
15/12/2020	AVCAT Storage and Fuel Farm	MW239	0089_MW239_201215			HydroSleeve	21.3	1.03	635	442	7.6	9		Clear
18/03/2021	AVCAT Storage and Fuel Farm	MW239	0089_MW239_210318			HydraSleeve	22.8	1.44	709	461.5	7.83	96		Clear
10/06/2021	AVCAT Storage and Fuel Farm	MW239	0089_MW239_210610			HydraSleeve	21	1.22	696	455	7.59	-7.3	diesel	Cloudy,Clear
31/08/2021	AVCAT Storage and Fuel Farm	MW239	0089_MW239_210831			Hydrasleeve	20.5	5.22	581	377	7.84	72.3		Brown
14/01/2020	AVCAT Storage and Fuel Farm	MW240	0089_MW240_200114			HydroSleeve	27.4	19.11	1112	769.5	7.51	-58.7		
1/04/2020	AVCAT Storage and Fuel Farm	MW240	0089_MW240_200401			HydroSleeve	23	4.01	888	578	7.51	-111.7		Clear
16/07/2020	AVCAT Storage and Fuel Farm	MW240	0089_MW240_200716			HydroSleeve	20.3	1.57	888	630.5	7.65	15.6		Clear
21/09/2020	AVCAT Storage and Fuel Farm	MW240	0089_MW240_200921		QC106, QC206	HydroSleeve	18.2	1.76	755	565	7.4	18.8		Brown,Clear
15/12/2020	AVCAT Storage and Fuel Farm	MW240	0089_MW240_201215			HydroSleeve	22.6	1.43	796	539.5	7.43	-14.1		Clear
18/03/2021	AVCAT Storage and Fuel Farm	MW240	0089_MW240_210318			HydraSleeve	23.7	2.49	964	624	7.75	86.9		
10/06/2021	AVCAT Storage and Fuel Farm	MW240	0089_MW240_210610			HydraSleeve	21.4	1.5	942	611	8.28	-3.8		Cloudy
31/08/2021	AVCAT Storage and Fuel Farm	MW240	0089_MW240_210831			Hydrasleeve	21.4	2.92	834	539.5	7.5	81.3		Clear
8/01/2020	AVCAT Storage and Fuel Farm	MW242	0089_MW242_200108			HydroSleeve							no	Clear
30/03/2020	AVCAT Storage and Fuel Farm	MW242	0089_MW242_200330			HydroSleeve	21.2	1.39	493.2	320.45	7.98	7.9		Clear
16/07/2020	AVCAT Storage and Fuel Farm	MW242	0089_MW242_200716			HydroSleeve	21.5	2.34	462.6	323.05	7.88	23.7		Clear
21/09/2020	AVCAT Storage and Fuel Farm	MW242	0089_MW242_200921			HydroSleeve	19	2.77	538	396.5	7.68	-2.6		Clear
15/12/2020	AVCAT Storage and Fuel Farm	MW242	0089_MW242_201215			HydroSleeve	23.3	0.71	653	435.5	7.68	-12.9		Clear
18/03/2021	AVCAT Storage and Fuel Farm	MW242	0089_MW242_210318			HydraSleeve	23.6	2.43	36676	442	7.42	39		Clear
9/06/2021	AVCAT Storage and Fuel Farm	MW242	0089_MW242_210609			HydraSleeve	20.8	2.48	312.4	203.1	7.81	-40.1		Clear
31/08/2021	AVCAT Storage and Fuel Farm	MW242	0089_MW242_210831			Hydrasleeve	21.8	3.52	901	585	7.71	84		Clear
14/01/2020	AVCAT Storage and Fuel Farm	MW243	0089_MW243_200114			HydroSleeve	23.4	5.55	450.5	303.55	7.62	-72.6		
1/04/2020	AVCAT Storage and Fuel Farm	MW243	0089_MW243_200401			HydroSleeve	21.2	4	766	500.5	7.51	-22.7		Clear
16/07/2020	AVCAT Storage and Fuel Farm	MW243	0089_MW243_200716			HydroSleeve	19.9	3.25	868	624	7.74	14.8		Clear
21/09/2020	AVCAT Storage and Fuel Farm	MW243	0089_MW243_200921			HydroSleeve	17.8	3.21	704	533	7.58	19.4		Clear
15/12/2020	AVCAT Storage and Fuel Farm	MW243	0089_MW243_201215			HydroSleeve	22.4	1.65	825	565.5	7.58	-9.2		Clear
18/03/2021	AVCAT Storage and Fuel Farm	MW243	0089_MW243_210318			HydraSleeve	21.7	2.29	1931	1254.5	7.73	-5.1		Clear
10/06/2021	AVCAT Storage and Fuel Farm	MW243	0089_MW243_210610			HydraSleeve	20.2	3	825	533	7.65	7.9		Clear
31/08/2021	AVCAT Storage and Fuel Farm	MW243	0089_MW243_210831			Hydrasleeve	19.9	2.86	800	520	7.64	80.6		Clear
14/01/2020	AVCAT Storage and Fuel Farm	MW245	0089_MW245_200114			HydroSleeve	23.4	4.07	3863	258.7	7.28	-89.6		
1/04/2020	AVCAT Storage and Fuel Farm	MW245	0089_MW245_200401			HydroSleeve	21.5	1.63	900	585	7.07	-44.6	Slight hc odour	Black
16/07/2020	AVCAT Storage and Fuel Farm	MW245	0089_MW245_200716			HydroSleeve	19.9	2.25	1238	890.5	7.15	-0.5	Fuel	Clear,Cloudy
21/09/2020	AVCAT Storage and Fuel Farm	MW245	0089_MW245_200921			HydroSleeve	18.1	2.21	916	682.5	7.05	26.2	Hydrocarbons	Cloudy,Black
15/12/2020	AVCAT Storage and Fuel Farm	MW245	0089_MW245_201215			HydroSleeve	21.3	1.67	914	637	7.36	-90.4	Hydrocarbon smell	Clear,Black
18/03/2021	AVCAT Storage and Fuel Farm	MW245	0089_MW245_210318			HydraSleeve	21.9	2.11	879	572	7.11	-129.4	HC	Black
10/06/2021	AVCAT Storage and Fuel Farm	MW245	0089_MW245_210610			HydraSleeve	21.8	0.88	1155	754	7.36	-137.2	Diesel.	Black
31/08/2021	AVCAT Storage and Fuel Farm	MW245	0089_MW245_210831			Hydrasleeve	18.8	1.67	705	461.5	7.4	69.5		Cloudy
17/01/2020	AVCAT Storage and Fuel Farm	MW247		Not found (Cardno, Jan 19) - Not located in February 2019 (GHD)										
8/01/2020	AVCAT Storage and Fuel Farm	MW248	0089_MW248_200108		103 and 203	HydroSleeve								Clear
1/04/2020	AVCAT Storage and Fuel Farm	MW248	0089_MW248_200401			HydroSleeve	219	1.8	1233	799.5	7.2	-158.9		
22/07/2020	AVCAT Storage and Fuel Farm	MW248	0089_MW248_200722			HydroSleeve	19.9	2.04	1579	1137.5	7.2	-150.2		Clear
21/09/2020	AVCAT Storage and Fuel Farm	MW248	0089_MW248_200921	Sampled with bailer due to shallow water level		HandBailing	18.5	2.98	1962	1456	7.33	124.7		Clear
15/12/2020	AVCAT Storage and Fuel Farm	MW248	0089_MW248_201215	Shallow water. Bailer used		HandBailing	21.9	1.3	1922	1326	7.3	-6.6		Clear
18/03/2021	AVCAT Storage and Fuel Farm	MW248	0089_MW248_210318	Shallow water, bailer used		HandBailing	22.5	1.61	1737	1131	7.3	-13.6		Clear
9/06/2021	AVCAT Storage and Fuel Farm	MW248	0089_MW248_210609			HydraSleeve	18.8	1.26	1534	997	7.39	-166.4		Clear
31/08/2021	AVCAT Storage and Fuel Farm	MW248		Dry		Hydrasleeve								
8/01/2020	AVCAT Storage and Fuel Farm	MW249	0089_MW249_200108			HydroSleeve								
30/03/2020	AVCAT Storage and Fuel Farm	MW249	0089_MW249_200330		Dup and trip	HydroSleeve	21.2	2.63	998	656.5	7.51	92.5		Cloudy
16/07/2020	AVCAT Storage and Fuel Farm	MW249	0089_MW249_200716		QC110, QC210	HydroSleeve	20.8	1.86	1308	923	7.63	-11.3	Metallic	Black,Cloudy
21/09/2020	AVCAT Storage and Fuel Farm	MW249	0089_MW249_200921	Bore sampled with bailer, water level too shallow	QC109, QC209	HandBailing	18.5	2.7	1198	890.5	7.43	68	Hydrocarbons	Cloudy,Black
15/12/2020	AVCAT Storage and Fuel Farm	MW249	0089_MW249_201215	Sampled with bailer (water too shallow for hydrasleeve)		HandBailing	22.8	0.9	1098	741	7.33	-72.4		Clear
15/03/2021	AVCAT Storage and Fuel Farm	MW249	0089_MW249_210315			HydraSleeve	22.6	6.2	1305	845	7.5	-197.2		Black
9/06/2021	AVCAT Storage and Fuel Farm	MW249	0089_MW249_210609			HydraSleeve	19.2	0.94	1243	806	7.32	-159.3	diesel	Black
31/08/2021	AVCAT Storage and Fuel Farm	MW249	0089_MW249_210831			Hydrasleeve	19.9	2.56	1303	845	7.67	82.6		Clear

Monitoring Date	Monitoring Area	LocationCode	Sample_ID	Observations	QC Dup Sample #	Purge Method	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Odour	Colour
30/03/2020	AVCAT Storage and Fuel Farm	MW516	0089_MW247_200330			HydroSleeve	22.1	1.45	1284	832	7.61	-6.8		Cloudy
21/07/2020	AVCAT Storage and Fuel Farm	MW516	0089_MW247_200721			HydroSleeve	21.6	8.47	3296	2294.5	7.27	8.89		
21/09/2020	AVCAT Storage and Fuel Farm	MW516	0089_MW516_200921			HydroSleeve	19.1	1.43	1359	944.5	7.17	83.1		Cloudy,Brown,Green
16/12/2020	AVCAT Storage and Fuel Farm	MW516	0089_MW516_201216			HydroSleeve	22.8	1.14	1455	988	7.15	5		Clear
18/03/2021	AVCAT Storage and Fuel Farm	MW516	0089_MW516_210318			HydraSleeve	22.5	0.77	1504	975	7.14	-136.2		Clear
9/06/2021	AVCAT Storage and Fuel Farm	MW516	0089_MW516_210609			HydraSleeve	17.7	1.66	1525	994.5	7.23	-4.3		Cloudy
31/08/2021	AVCAT Storage and Fuel Farm	MW516	0089_MW516_210831			Hydrasleeve	23.6	0.87	2246	1462.5	7.12	72.8		Cloudy
8/01/2020	Demolition Ground	MW137	0089_MW137_200108	bore labelled MW098		HydroSleeve	22.1	0.05	36136	23491	7.45	-4.5	no	Clear
30/03/2020	Demolition Ground	MW137	0089_MW137_200330	Labelled MW098 in PVC		HydroSleeve	20.9	1.74	37641	22462.5	7.3	-381.2		
20/07/2020	Demolition Ground	MW137	0089_MW137_200720			HydroSleeve	14.9	2.09	18148	14592		18.3		Clear
23/09/2020	Demolition Ground	MW137	0089_MW137_200923			HydroSleeve	16.2	2.96	57088	37108	7.73	11.6		Clear,Cloudy
14/12/2020	Demolition Ground	MW137	0089_MW137_201214			HydroSleeve	21.3	1.86	55104		6.89	90.3		Clear
16/03/2021	Demolition Ground	MW137	0089_MW137_210316			HydraSleeve	23.7	0.97	53784	34970	7.39	7.8		Cloudy
8/06/2021	Demolition Ground	MW137	0089_MW137_210608			HydraSleeve	17.3	3.45	51860	33710	7.64	131.8		Clear
30/08/2021	Demolition Ground	MW137		Dry										
8/01/2020	Demolition Ground	MW139	0089_MW139_200108	QC101/201	101/201	HydroSleeve	21.9	4.01	5072	3295.5	7.69	-43.2	no	Clear
30/03/2020	Demolition Ground	MW139	0089_MW139_200330			HydroSleeve	20.9	4.23	10494	6253.5	7.17	-314		Brown
20/07/2020	Demolition Ground	MW139	0089_MW139_200720	PH under range		HydroSleeve	17.4	7.99	11385	8658		43.5		Clear
22/09/2020	Demolition Ground	MW139	0089_MW139_200922			HydroSleeve	20.5	3.36	13544	8801	7.51	12.5		Clear
14/12/2020	Demolition Ground	MW139	0089_MW139_201214			HydroSleeve	21	2.45	6350		7.45	15.4		Clear
16/03/2021	Demolition Ground	MW139	0089_MW139_210316			HydraSleeve	23.2	11.4	4339	2814.5	7.47	64.7		Clear
8/06/2021	Demolition Ground	MW139	0089_MW139_210608		Qc101/201	HydraSleeve	16.9	1.92	3013	1958	7.71	527		Clear
31/08/2021	Demolition Ground	MW139	0089_MW139_210831			Hydrasleeve	19.8	3.57	565	346	8.07	99.8		Clear
8/01/2020	Demolition Ground	MW141	0089_MW141_200108			HydroSleeve	21.6	1.97	25555	16659.5	7.11	-250	Sulfur	Clear
30/03/2020	Demolition Ground	MW141	0089_MW141_200330			HydroSleeve	20.5	6.24	26742	6082	7.16	-374.1		
20/07/2020	Demolition Ground	MW141	0089_MW141_200720			HydroSleeve	17.7	5.72	15605	11765		-4.2		Clear
23/09/2020	Demolition Ground	MW141	0089_MW141_200923			HydroSleeve	19.1	1.39	28278	18388.5	7.37	-32.6		Clear
14/12/2020	Demolition Ground	MW141	0089_MW141_201214			HydroSleeve	21.3	1.04	31614		7.18	-180.8		Clear
16/03/2021	Demolition Ground	MW141	0089_MW141_210316			HydraSleeve	21.8	0.69	33145	21554	7.18	-246.1	sulphur	Cloudy
8/06/2021	Demolition Ground	MW141	0089_MW141_210608			HydraSleeve	19	0.57	33953	22072	7.06	-259.6	sulphur	Clear
31/08/2021	Demolition Ground	MW141	0089_MW141_210831			Hydrasleeve	24.1	2.83	14365	9334.5	7.13	-161.8		Clear
8/01/2020	Demolition Ground	MW142	0089_MW142_200108			HydroSleeve	21.5	2.55	24002	15906.5	7.2	-55.7	no	Clear
30/03/2020	Demolition Ground	MW142	0089_MW142_200330			HydroSleeve	21.4	1.69	24703	4580.5	6.93	-381	Slight sulphur	Clear
20/07/2020	Demolition Ground	MW142	0089_MW142_200720			HydroSleeve	17.7	1.74	16821	12668		1.3		Clear
23/09/2020	Demolition Ground	MW142	0089_MW142_200923			HydroSleeve	16.6	3.74	39939	25974	7.4	26		Clear
14/12/2020	Demolition Ground	MW142	0089_MW142_201214			HydroSleeve	19.3	1.89	38842		7.27	-65.8		Clear
16/03/2021	Demolition Ground	MW142	0089_MW142_210316			HydraSleeve	23.9	0.84	41270	26819	7.28	-76.2		Yellow
8/06/2021	Demolition Ground	MW142	0089_MW142_210608			HydraSleeve	18.7	2.63	37490	24667	7.34	31.7		Brown
30/08/2021	Demolition Ground	MW142	0089_MW142_210830			Hydrasleeve	18.3	2.18	25163	16367	7.74	-97.8		Cloudy
8/01/2020	Demolition Ground	MW147	0089_MW147_200108	Dry										
30/03/2020	Demolition Ground	MW147		Bore dry - no sample able to be taken										
20/07/2020	Demolition Ground	MW147	0089_MW147_200720			HandBailing	17.6	5.38	13855	10497		-31.6		Cloudy
23/09/2020	Demolition Ground	MW147		Dry		HydroSleeve								
14/12/2020	Demolition Ground	MW147		Dry		HydroSleeve								Clear
16/03/2021	Demolition Ground	MW147		Dry										
8/06/2021	Demolition Ground	MW147		DRY		HydraSleeve								
30/08/2021	Demolition Ground	MW147		Dry										
8/01/2020	Demolition Ground	MW149	0089_MW149_200108			HydroSleeve	21.4	2.59	27039	17576	7.34	-96.1	no	
30/03/2020	Demolition Ground	MW149	0089_MW149_200330			HydroSleeve	20.3	4.5	34240	20674.5	7.31	-374.9		Clear
20/07/2020	Demolition Ground	MW149	0089_MW149_200720			HydroSleeve	16.3	6.1	18049	14066		8.2		Clear,Brown
23/09/2020	Demolition Ground	MW149	0089_MW149_200923			HydroSleeve	13.7	6.23	42411	35152	7.62	141.1		Clear
14/12/2020	Demolition Ground	MW149	0089_MW149_201214			HydroSleeve	23.9	0.69	55331		8.04	49.5		Clear
16/03/2021	Demolition Ground	MW149	0089_MW149_210316			HydraSleeve	20.8	9.5	53451	34742	7.39	73.1		Clear
8/06/2021	Demolition Ground	MW149	0089_MW149_210608		QC105/205	HydraSleeve	16.1	0.83	49531	32198	7.24	13.4		
30/08/2021	Demolition Ground	MW149	0089_MW149_210830			Hydrasleeve	16	5.05	51642	33553	7.87	50.9		Clear
8/01/2020	Demolition Ground	MW272	0089_MW272_200108			HandBailing	21.2	3.88	37100	24115	7.51	-68.8	no	Clear
30/03/2020	Demolition Ground	MW272	0089_MW272_200330			HydroSleeve	21.2	1.52	36420	21521.5	7.34	-390.5		
22/09/2020	Demolition Ground	MW272	0089_MW272_200922			HydroSleeve	16.9	3.61	54300	35613.5	7.65	39.5		Clear
14/12/2020	Demolition Ground	MW272	0089_MW272_201214		qc106/qc206	HydroSleeve	23.6	0.92	48180		7.42	24.4		Clear
16/03/2021	Demolition Ground	MW272	0089_MW272_210316			HydraSleeve	23.1	1.88	58883	38285	7.45	93.6		Clear
8/06/2021	Demolition Ground	MW272	0089_MW272_210608			HydraSleeve	18.1	0.51	50007	32508	7.47	90.2		Clear
31/08/2021	Demolition Ground	MW272	0089_MW272_210831			Hydrasleeve	19.1	2.2	30086	19565	7.2	-175.9		Clear
16/12/2020	Dredge Spoil / Careening Bay	MW010	0089_MW010_201216			HydroSleeve	20.9	0.41	2362	1534	7.21	-192.7	Hydrocarbon odour	Clear
18/03/2021	Dredge Spoil / Careening Bay	MW010	0089_MW010_210318			HydraSleeve	22.1	2.39	2854	1852.5	7.35	-137	Fuel smell	Clear
9/06/2021	Dredge Spoil / Careening Bay	MW010	0089_MW010_210609			HydraSleeve	17.3	1.34	4237	2754	7.53	-224		Clear
31/08/2021	Dredge Spoil / Careening Bay	MW010	0089_MW010_210831			Hydrasleeve	21.1	1.13	3054	1989	7.26	-111.6	Diesel	Cloudy,Clear
19/12/2019	Dredge Spoil / Careening Bay	MW264	0089_MW264_191219			HydroSleeve	20.2	1.34	1180	845	7.48	13.7		
30/03/2020	Dredge Spoil / Careening Bay	MW264	0089_MW264_200330			HydroSleeve	22.1	1.25	1345	871	7.52	-22.1		Clear
22/09/2020	Dredge Spoil / Careening Bay	MW264	0089_MW264_200922			HydroSleeve	19.3	5.32	1257	916.5	7.45	5.8		Clear
14/12/2020	Dredge Spoil / Careening Bay	MW264	0089_MW264_201214		Qc110/210	HydroSleeve	19.8	1.75	1227		7.49	51.3		Clear
18/03/2021	Dredge Spoil / Careening Bay	MW264	0089_MW264_210318			HydraSleeve	21.9	1.31	36728	728	7.42	87.2		Clear
9/06/2021	Dredge Spoil / Careening Bay	MW264	0089_MW264_210609			HydraSleeve	18.6	1.88	1095	715	7.53	-3.9		Clear
31/08/2021	Dredge Spoil / Careening Bay	MW264	0089_MW264_210831			Hydrasleeve	20.4	3.31	2218	1443	7.57	96.3		Clear
19/12/2019	Dredge Spoil / Careening Bay	MW268	0089_MW268_191219			HydroSleeve	19.3	3.85	4279	3120	7.07	103.1		
30/03/2020	Dredge Spoil / Careening Bay	MW268	0089_MW268_200330			HydroSleeve	22.2	1.87	5341	3451.5	7.35	-26.1	Ants in well, rotten egg odour	Clear
21/09/2020	Dredge Spoil / Careening Bay	MW268	0089_MW268_200921			HydroSleeve	19.8	2.78	8611	5596.5	7.37	72.3		Clear
14/12/2020	Dredge Spoil / Careening Bay	MW268	0089_MW268_201214			HydroSleeve	21.7	1.22	8601		7.31	105		Clear
16/03/2021	Dredge Spoil / Careening Bay	MW268	0089_MW268_210316		QC116, QC 216	HydraSleeve	22.4	0.76	9295	6038.5	7.35	58		Clear
9/06/2021	Dredge Spoil / Careening Bay	MW268	0089_MW268_210609			HydraSleeve	18.2	1.1	10486	6818.5	7.21	-14.9		Clear
31/08/2021	Dredge Spoil / Careening Bay	MW268	0089_MW268_210831			Hydrasleeve	22.3	1.87	6717	4368	7.28	74.9		Clear
19/12/2019	Dredge Spoil / Careening Bay	MW269	0089_MW269_191219			HydroSleeve	19.1	1.56	827	604.5	7.55	-17.7		Clear, Cloudy
30/03/2020	Dredge Spoil / Careening Bay	MW269	0089_MW269_200330			HydroSleeve	21.9	1.23	1408	1323	7.59	-77.9		Clear
21/09/2020	Dredge Spoil / Careening Bay	MW269	0089_MW269_200921			HydroSleeve	19.8	2.16	1624	1053	7.6	-137.3		Clear
14/12/2020	Dredge Spoil / Careening Bay	MW269	0089_MW269_201214			HydroSleeve	21.5	2.91	1927		7.67	-31.2		Clear
16/03/2021	Dredge Spoil / Careening Bay	MW269	0089_MW269_210316			HydraSleeve	22.7	0.84	2366	1540.5	7.69	-230.5	sulphur	Clear
9/06/2021	Dredge Spoil / Careening Bay	MW269	0089_MW269_210609			HydraSleeve	17.9	2.07	2223	1443	7.52	-190.2	sulphur	Clear
31/08/2021	Dredge Spoil / Careening Bay	MW269	0089_MW269_210831			Hydrasleeve	21.4	1.61	1775	1150.5	7.41	-57.2		Clear
8/01/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW250	0089_MW250_200108	Not found - Location "unconfirmed" in Esdat										
19/12/2019	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW255	0089_MW255_191219	Dry		HydroSleeve								
2/04/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW255		BORE DRY		HydroSleeve								
16/07/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW255	0089_MW255_200716		QC109, QC209	HydroSleeve	19.9	2.76	1086	780	7.69	769		Clear,Cloudy
22/09/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW255	0089_MW255_200922		QC114, QC214	HydroSleeve	18.8	2.95	932	689	7.37	75	Slight hydrocarbon odour	Cloudy,Black
16/12/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW255	0089_MW255_201216			HydroSleeve	23	3.72	662		0.34	-17.5		Clear
17/03/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW255	0089_MW255_210317			HydraSleeve	24.3	0.96	1847	1202	7.64	-80		
10/06/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW255	0089_MW255_210610			HydraSleeve	20.3	0.99	968	630.5	7.89	-178		Cloudy

Monitoring Date	Monitoring Area	LocationCode	Sample_ID	Observations	QC Dup Sample #	Purge Method	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Odour	Colour
31/08/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW255	0089_MW255_210831	Murky		Hydrasleeve	20.2	2.21	928	604.5	7.45	-31.7		Cloudy
8/01/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW256	0089_MW256_200108	Root blockage at 3m could not sample										
30/03/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW256	0089_MW256_200330			HydroSleeve	20.7	1.06	2443	1586	7.71	-89.2		Clear
16/07/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW256	0089_MW256_200716			HydroSleeve	19.1	1.75	1197	884	7.49	-52.3	Stagnant	Black,Clear
22/09/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW256	0089_MW256_200922			HydroSleeve	17.9	1.95	868	650	7.19	86.2		Clear
14/12/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW256	0089_MW256_201214			HydroSleeve	20.5	2.17	1203		7.25	82.9		Clear
17/03/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW256	0089_MW256_210317			HydraSleeve	21.9	1.24	1955	1267.5	7.33	-116.6		Clear
10/06/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW256	0089_MW256_210610		QC113/213	HydraSleeve	20	0.9	1471	955.5	7.02	-224.8		Cloudy
31/08/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW256	0089_MW256_210831			Hydrasleeve	19.7	1.86	1477	962	7.37	-175.5		Clear
19/12/2019	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW257	0089_MW257_191219			HydroSleeve	19.8	5.32	473.3	341.9	7.91	38.6		
2/04/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW257	0089_MW257_200402	SWL TAKEN AFTER SAMPLING - INACCURATE READING		HydroSleeve	21.8	5.69	539	313.5	7.66	-154.8		
16/07/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW257	0089_MW257_200716	Sampled with Bailer (shallow water)		Bailer	18.8	6.56	335.4	247	8.27	10		Cloudy,Brown
22/09/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW257	0089_MW257_200922			HydroSleeve	18.5	6.33	365.8	271.05	7.96	76.3		Clear
16/12/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW257	0089_MW257_201216			HydroSleeve	23.3	5.24	3116		7.8	18.5		Clear
18/03/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW257	0089_MW257_210318			HydraSleeve	22.2	5.14	579	377	7.78	74.9		Clear
9/06/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW257	0089_MW257_210609			HydraSleeve	17.8	5.5	491	319.1	8.15	-60.1		Clear
31/08/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW257	0089_MW257_210831			Hydrasleeve	18.8	6.51	328.8	213.85	8.19	56.8		Clear
19/12/2019	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW258	0089_MW258_191219	Dry		HydroSleeve								
2/04/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW258		BORE DRY		HydroSleeve								
16/07/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW258		DRY										
22/09/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW258		Dry. Bore appears to be blocked (tree roots)		HydroSleeve								
16/12/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW258		Dry		HydroSleeve								Clear
18/03/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW258		Dry. Potentially blocked by tree roots										
10/06/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW258		DRY		HydraSleeve								
31/08/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW258		Dry										
19/12/2019	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW259	0089_MW259_191219	Dry - Not located in February 2019 (GHD)		HydroSleeve								
2/04/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW259		OBSTRUCTION IN BORE AT 3.4M - UNABLE TO SAMPLE VIA HAND BAILER		HydroSleeve								
16/07/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW259	0089_MW259_200716	Sampled with Bailer (shallow water)		Bailer	19.4	3.28	432.5	314.6	7.84	13.1		Brown
22/09/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW259	0089_MW259_200922			HydroSleeve	18.5	3.82	529	390	7.48	94.9		Cloudy,Black
16/12/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW259	0089_MW259_201216			HydroSleeve	21.3	1.97	3068	1195.5	7.37	38.7		Clear
18/03/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW259	0089_MW259_210318			HydraSleeve	21.3	2.66	36564	364	7.42	76.4		Clear
10/06/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW259	0089_MW259_210610			HydraSleeve	19.7	2.79	715	468	8.13	90.8		Clear
31/08/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW259	0089_MW259_210831	Roots		Hydrasleeve	18.2	3.82	533.5	347.1	7.39	85.8		Clear
17/01/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW260		Not found - Location "unconfirmed" in Esdat										
19/12/2019	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW261	0089_MW261_191219		QC102 QC202	HydroSleeve	21.3	1.56	1335	936	7.25	-79.4		
30/03/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW261	0089_MW261_200330			HydroSleeve	22	1.52	2643	1716	7.4	-157.7	Rotten egg	Clear
21/07/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW261	0089_MW261_200721			HydroSleeve	19.7	3.28	2708	1956.5	7.37	-173.3		
22/09/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW261	0089_MW261_200922			HydroSleeve	19.3	2.46	2287	1670.5	7.34	-61.2	Slight hydrocarbon odour	Clear
16/12/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW261	0089_MW261_201216			HydroSleeve	20	1.54	2637	1859	7.39	-17.1	Hydrocarbon smell	Clear
18/03/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW261	0089_MW261_210318	Fuel smell		HydraSleeve	21.5	0.69	2965	1924	7.26	-143.3	Fuel smell	Clear
9/06/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW261	0089_MW261_210609			HydraSleeve	17.9	1.31	2886	1877	7.48	-148.7		Clear
31/08/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW261	0089_MW261_210831			Hydrasleeve	20.8	1.8	1964	1274	7.34	-217.7	Diesel. Lots of black sediment	Clear
17/01/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW262		Bore destroyed										
15/07/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW315	0089_MW315_200715	Sampled instead of MW262 - Hydrocarbon impact		HydroSleeve	19.1	12.05	1804	1332.5	6.78	70.1	Diesel	Cloudy
2/04/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW331	0089_MW331_200402	replacement for MW331		HydroSleeve	24.9	2.34	1900	1045	6.85	0.1881	Strong diesel smell	Black,Cloudy
22/09/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW331	0089_MW331_200922	Bore sampled with bailer, water level too shallow		HandBailing	20.6	1.9	1771	1254.5	7.04	-38	Strong hydrocarbon odour	Cloudy,Green,Clear
30/03/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW517	0089_MW250_200330			HydroSleeve	20.8	2.57	367.2	238.55	8.11	-10.3		
16/07/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW517	0089_MW250_200716			HydroSleeve	18.4	4.52	902		8.27	-6.1		Clear,Cloudy
22/09/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW517	0089_MW517_200922			HydroSleeve	19.6	2.45	688	442	7.98	83		Clear,Cloudy
15/12/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW517	0089_MW517_201215			HydroSleeve	20.4	1.87	510	364	8.07	-28.3		Clear
18/03/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW517	0089_MW517_210318			HydraSleeve	22.7	2.81	752	487.5	7.51	63		Clear
9/06/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW517	0089_MW517_210609			HydraSleeve	16.4	2.87	1131	735	7.48	-79.9		Clear
31/08/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW517	0089_MW517_210831			Hydrasleeve	20.8	1.92	1094	708.5	7.72	-124.3		Clear,Cloudy
30/03/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW518	0089_MW260_200330			HydroSleeve	21	0.69	1214	786.5	7.96	-36.8	Rotten egg	Clear
21/07/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW518	0089_MW260_200721			HydroSleeve	201	5.22	1051	754	7.8	5		
22/09/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW518	0089_MW518_200922			HydroSleeve	18.6	2.98	1691	1254.5	7.65	114.1		Clear
16/12/2020	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW518	0089_MW518_201216			HydroSleeve	20.2	1.05	2386	1553.5	7.6	46		Clear
18/03/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW518	0089_MW518_210318			HydraSleeve	21.1		36231	1501.5	7.47	89.3		Clear
9/06/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW518	0089_MW518_210609		QC111/211	HydraSleeve	17.2	0.92	1841	1196	7.4	-12.1	slight hydrocarbon	Cloudy
31/08/2021	Fire Station, Flammable/Hazardous Goods and Waste Storage, Ship Sullage	MW518	0089_MW518_210831	Roots present		Hydrasleeve	20.5	1.48	1912	1241.5	7.3	-18.9		Cloudy
16/12/2019	Fire Training Area	MW109	0089_MW109_191216			HydroSleeve	26.1	1.92	801	507	7.04	-50	no	Clear,Cloudy
30/03/2020	Fire Training Area	MW109	0089_MW109_200330			HydroSleeve	21.8	1.55	918	637	7.34	-102.2		Clear
15/07/2020	Fire Training Area	MW109	0089_MW109_200715		QC105, QC205	HydroSleeve	19.1	2.77	923		7.28	23.9		Clear
21/09/2020	Fire Training Area	MW109	0089_MW109_200921			HydroSleeve	19.2	2.18	1434	936	7.97	-58		Clear
14/12/2020	Fire Training Area	MW109	0089_MW109_201214		QC108, QC208	HydroSleeve	22.3	0.73	1620	1111.5	7.4	-79.3		Cloudy
16/03/2021	Fire Training Area	MW109	0089_MW109_210316			HydraSleeve	22.4	0.32	1173	115050	7.44	-223.7		Clear
8/06/2021	Fire Training Area	MW109	0089_MW109_210608			HydraSleeve	20	3.03	497.6	323.7	7.52	-170.4		Clear
30/08/2021	Fire Training Area	MW109	0089_MW109_210830			Hand Bailing	20.1	2.41	842	546	7.36	37.5		Clear
8/01/2020	Fire Training Area	MW112	0089_MW112_200108	Gatic flush, Need metal detector to find it		HydroSleeve	23.6	4.06	651	422.5	7.7	-68.6		Clear
30/03/2020	Fire Training Area	MW112	0089_MW112_200330		QC102 & QC202	HydroSleeve	23.6	2.24	540	357.4	7.48	164.4		Clear
15/07/2020	Fire Training Area	MW112	0089_MW112_200715			HydroSleeve	19.8	3.1	505		7.56	75.1		Clear
21/09/2020	Fire Training Area	MW112	0089_MW112_200921	labelled MW119 in CoC		HydroSleeve	20.5	3.48	699	455	7.73	-7.8		Clear
14/12/2020	Fire Training Area	MW112	0089_MW112_201214			HydroSleeve	21.9	1.76	653	448.5	7.52	-71.6		Clear,Cloudy
16/03/2021	Fire Training Area	MW112	0089_MW112_210316	QC112, QC212	112, 212	HydraSleeve	23.2	1.65	534	344.5	7.63	116.7		Clear,Green
8/06/2021	Fire Training Area	MW112	0089_MW112_210608			HydraSleeve	20	2.29	548.8	356.2	7.71	36.6		Clear
30/08/2021	Fire Training Area	MW112	0089_MW112_210830			Hydrasleeve	19.7	2.39	523.7	340.6	7.51	80.2		Brown
16/12/2019	Fire Training Area	MW117	0089_MW117_191216			HydroSleeve	25.1	2.64	973	630.5	6.86	-219	no	Cloudy,Clear
30/03/2020	Fire Training Area	MW117	0089_MW117_200330		QC101 / 201	HydroSleeve	23	18.2	1028	669.5	6.85	129.3		Cloudy,Clear
15/07/2020	Fire Training Area	MW117	0089_MW117_200715			HydroSleeve	19.9	2.88	1.28		6.84	63.2		Clear
21/09/2020	Fire Training Area	MW117	0089_MW117_200921		QC107/207	HydroSleeve	20	3.47	1024	663	7.22	71.7		Cloudy,Brown
14/12/2020	Fire Training Area	MW117	0089_MW117_201214			HydroSleeve	20.3	0.74	943	611	7.18	30.9		Cloudy
16/03/2021	Fire Training Area	MW117	0089_MW117_210316	QC109, QC209	109, 209	HydraSleeve	23.2	1.41	1072	695.5	7.19	110.3		Clear,Green
8/06/2021	Fire Training Area	MW117	0089_MW117_210608	QC106/206	QC106/206	HydraSleeve	20.5	0.95	900	585	7.37	62.6		Clear
30/08/2021	Fire Training Area	MW117	0089_MW117_210830			Hydrasleeve	19.6	1.32	684	442	7.35	68		Clear
16/12/2019	Fire Training Area	MW120	0089_MW120_191216			HydroSleeve	22.4	3.78	700	455	7.5	181.5		Clear
30/03/2020	Fire Training Area	MW120	0089_MW120_200330			HydroSleeve	23	2.58	608	409.5	7.52	174.1		Clear
15/07/2020	Fire Training Area	MW120	0089_MW120_200715		QC106, QC206	HydroSleeve	19.1	2.04	464.1		7.54	60.8		Clear
21/09/2020	Fire Training Area	MW120		Dry		HydroSleeve								
14/12/2020	Fire Training Area	MW120	0089_MW120_201214			HydroSleeve	20.8	0.9	589	416	7.58	-49.9		Clear
16/03/2021	Fire Training Area	MW120	0089_MW120_210316	Cloudy		HydraSleeve	23.2	2.06	635	409.5	7.64	82.2		Cloudy
8/06/2021	Fire Training Area	MW120	0089_MW120_210608			HydraSleeve	19.6	1.08	633	409.5	7.7	-33		Clear
30/08/2021	Fire Training Area	MW120	0089_MW120_210830			Hydrasleeve	19.7	2.26	639	416	7.5	74.6		Cloudy
16/12/2019	Fire Training Area	MW121	0089_MW121_191216			HydroSleeve	25.6	5.74	592	383.5	7.27	171.6	no	Cloudy
30/03/2020	Fire Training Area	MW121	0089_MW121_200330			HydroSleeve	22.6	1.8	590	403	7.57	108.6		Cloudy
15/07/2020	Fire Training Area	MW121	0089_MW121_200715			HydroSleeve	19.5	13.28	521		7.36	57.2		Clear

Monitoring Date	Monitoring Area	LocationCode	Sample_ID	Observations	QC Dup Sample #	Purge Method	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Odour	Colour
21/09/2020	Fire Training Area	MW121	0089_MW121_200921			HydroSleeve	21.4	5.38	751	487.5	7.55	54.6		Clear
14/12/2020	Fire Training Area	MW121	0089_MW121_201214			HydroSleeve	20	3.76	661	429	7.76	-12.4		Clear
16/03/2021	Fire Training Area	MW121	0089_MW121_210316			HydraSleeve	24.2	3.89	661	429	7.69	61.8		Cloudy
8/06/2021	Fire Training Area	MW121	0089_MW121_210608			HydraSleeve	18.5	4.7	806	526.5	7.68	77		Clear
30/08/2021	Fire Training Area	MW121	0089_MW121_210830			Hydrasleeve	20.3	5.72	733	481	7.72	87.4		Clear,Cloudy
16/12/2019	Fire Training Area	MW123	0089_MW123_191216	QC101 201 taken	101 201	HandBailing	22.1	5.47	677	442	7.22	104.1	no	Cloudy
30/03/2020	Fire Training Area	MW123		Dry		HydroSleeve								
15/07/2020	Fire Training Area	MW123		DRY		HydroSleeve								
21/09/2020	Fire Training Area	MW123		Dry		HydroSleeve								
14/12/2020	Fire Training Area	MW123	0089_MW123_201214			HandBailing	20.3	2.21	1655	1079	7.84	-125.8		Cloudy
16/03/2021	Fire Training Area	MW123	0089_MW123_210316	Hand bailed QC108/208	108/208	HydraSleeve	26	1.41	695	455	7.3	33.3		Cloudy
8/06/2021	Fire Training Area	MW123	0089_MW123_210608	QC102/202	QC102/202	HydraSleeve	18.6	1.84	820	533	7.42	-153.2		Cloudy
30/08/2021	Fire Training Area	MW123	0089_MW123_210830	Hand bailed.Slight hydrocarbon odour		Hand Bailing	19.6	1.74	770	500.5	7.38	-190.2	Slight hydrocarbon	Clear
9/01/2020	Fire Training Area	MW124	0089_MW124_200109		101 and 201	HydroSleeve								Clear
30/03/2020	Fire Training Area	MW124	0089_MW124_200330			HydroSleeve	21	4.29	39913	28093	7.14	-212.4		Clear
15/07/2020	Fire Training Area	MW124	0089_MW124_200715			HydroSleeve	15.6	6.09	40089	1772	7.04	7.05		Cloudy,Clear
22/09/2020	Fire Training Area	MW124	0089_MW124_200922			HydroSleeve	19.3	2.19	47467	30855.5	7.36	-82.3		Black,Clear
14/12/2020	Fire Training Area	MW124	0089_MW124_201214			HydroSleeve	19.5	0.51	40107	29120	7.16	-188.3	Salty	Clear
15/03/2021	Fire Training Area	MW124	0089_MW124_210315			HydraSleeve	20.8	0.83	38532	27209	7.99	-262.9		Clear
8/06/2021	Fire Training Area	MW124	0089_MW124_210608			HydraSleeve	19	0.97	42836	27852.5	7.31	-169.1		Cloudy
30/08/2021	Fire Training Area	MW124	0089_MW124_210830			Hydrasleeve	17	1.27	42307	27495	7.26	-226.3		Clear
9/01/2020	Fire Training Area	MW125	0089_MW125_200109			HydroSleeve							no	Clear
30/03/2020	Fire Training Area	MW125	0089_MW125_200330			HydroSleeve	20.7	2.5	42625	30153.5	7.02	-178.8		Clear
15/07/2020	Fire Training Area	MW125	0089_MW125_200715			HydroSleeve	16.4	4.35	40575	31525	7.09	-171.3		Clear
22/09/2020	Fire Training Area	MW125	0089_MW125_200922			HydroSleeve	19.2	1.82	48861	31752.5	7.16	-154.5		Clear,Black
14/12/2020	Fire Training Area	MW125	0089_MW125_201214			HydroSleeve	19.6	0.29	40970	29685	7.14	-187.9	Salty	Clear
15/03/2021	Fire Training Area	MW125	0089_MW125_210315			HydraSleeve	21.1	0.81	44213	31070	7.4	-199.4		Clear
8/06/2021	Fire Training Area	MW125	0089_MW125_210608			HydraSleeve	19	1.02	45553	29614	7.29	-148		Clear
30/08/2021	Fire Training Area	MW125	0089_MW125_210830	QC101, QC201	QC101, QC201	Hydrasleeve	17.6	0.5	29455	19142.5	7.18	-205.3	Salty	Clear
8/01/2020	Fire Training Area	MW126	0089_MW126_200108			HydroSleeve	21.1	4.67	41841	29451.6	7.09	-289		Clear
31/03/2020	Fire Training Area	MW126	0089_MW126_200331			HydroSleeve	19.5	1.8	38371	28093.5	7.04	-230.3	Rotten egg smell	Clear
15/07/2020	Fire Training Area	MW126	0089_MW126_200715			HydroSleeve	16.7	2.96	40030	30940	6.91	-234.8		Clear
22/09/2020	Fire Training Area	MW126	0089_MW126_200922			HydroSleeve	19.3	0.91	46315	30108	7.17	-162.3		Clear,Black
14/12/2020	Fire Training Area	MW126	0089_MW126_201214			HydroSleeve	19.7	0.64	37968	370456	7.03	-217.1		Clear
15/03/2021	Fire Training Area	MW126	0089_MW126_210315	bore missing cap. needs replacing		HydraSleeve	20.3	1.24	40561	28957.5	7.24	-254.2	Seawater	Clear
8/06/2021	Fire Training Area	MW126	0089_MW126_210608			HydraSleeve	19.7	1.29	43757	28437.5	7.33	-225.3		Clear
30/08/2021	Fire Training Area	MW126	0089_MW126_210830			Hydrasleeve	18.8	1.24	43803	28470	6.94	-217.3	Salty	Clear
8/01/2020	Fire Training Area	MW127	0089_MW127_200108			HydroSleeve	23.4	1.8	40920	27417	7.14	-263.9		Clear
31/03/2020	Fire Training Area	MW127	0089_MW127_200331			HydroSleeve	23	0.52	39878	26949	7.11	-233.3		Clear
15/07/2020	Fire Training Area	MW127	0089_MW127_200715			HydroSleeve	17.3	3.29	34614	26383.5	7.11	-222.5		Clear
22/09/2020	Fire Training Area	MW127	0089_MW127_200922			HydroSleeve	19.7	0.77	43370	28190.5	7.31	-158.7		Clear
14/12/2020	Fire Training Area	MW127	0089_MW127_201214			HydroSleeve	19.8	0.6	36014	26019.5	7.15	-210.3	Salty	Clear
15/03/2021	Fire Training Area	MW127	0089_MW127_210315			HydraSleeve	20.8	0.66	38542	27235	7.32	-264.4	Seawater	Clear
8/06/2021	Fire Training Area	MW127	0089_MW127_210608			HydraSleeve	20.1	0.94	40922	26598	7.35	-246.2		Clear
30/08/2021	Fire Training Area	MW127	0089_MW127_210830			Hydrasleeve	18.5	0.77	36917	23998	7.05	-216	Salty	Clear
16/12/2019	Fire Training Area	MW128	0089_MW128_191216	Dry		HydroSleeve								
30/03/2020	Fire Training Area	MW128		Dry		HydroSleeve								
15/07/2020	Fire Training Area	MW128		DRY		HydroSleeve								
21/09/2020	Fire Training Area	MW128		Dry		HydroSleeve								
14/12/2020	Fire Training Area	MW128		DRY		HydroSleeve								Clear
16/03/2021	Fire Training Area	MW128		DRY										
8/06/2021	Fire Training Area	MW128		Dry at 3.7		HydraSleeve								
30/08/2021	Fire Training Area	MW128		Dry										
10/01/2020	Helicopter Support Facility	MW214	0089_MW214_200110	Dry										
31/03/2020	Helicopter Support Facility	MW214		Bore Dry										
22/07/2020	Helicopter Support Facility	MW214		Dry										
24/09/2020	Helicopter Support Facility	MW214		Dry										Clear
15/12/2020	Helicopter Support Facility	MW214		DRY		HydroSleeve								Clear
18/03/2021	Helicopter Support Facility	MW214		Dry										
9/06/2021	Helicopter Support Facility	MW214		Dry		HydraSleeve								
1/09/2021	Helicopter Support Facility	MW214	0089_MW214_210901	Bore blocked by fine sedimend. Unblocked.		Hydrasleeve	18.2	3.88	2914	1891.5	7.28	-138.8	Stagnant	Black,Cloudy
10/01/2020	Helicopter Support Facility	MW215	0089_MW215_200110	Dry										
31/03/2020	Helicopter Support Facility	MW215		Bore Dry 3.34m										
22/07/2020	Helicopter Support Facility	MW215		Dry										
24/09/2020	Helicopter Support Facility	MW215		Dry										Clear
15/12/2020	Helicopter Support Facility	MW215		Dry		HydroSleeve								Clear
18/03/2021	Helicopter Support Facility	MW215		Dry										
9/06/2021	Helicopter Support Facility	MW215		Dry at 3.11		HydraSleeve								
1/09/2021	Helicopter Support Facility	MW215	0089_MW215_210901	Blockage cleared with steel bailer		Hydrasleeve	18.9	1.7	1446	942	8.15	-26.2		Clear
19/12/2019	Helicopter Support Facility	MW216	0089_MW216_191219			HydroSleeve	18.6	3.95	1142	845	7.53	137.5		
31/03/2020	Helicopter Support Facility	MW216	0089_MW216_200331			HydroSleeve	20	7.38	1479	896.5	7.27	-276.4		Clear
22/07/2020	Helicopter Support Facility	MW216	0089_MW216_200722			HydroSleeve	19.6	4.81	1304	949	7.39	25.4		
24/09/2020	Helicopter Support Facility	MW216		Dry										Clear
15/12/2020	Helicopter Support Facility	MW216	0089_MW216_201215	Hydrasleeve broken. Replaced with new	QC113, QC213	HandBailing	20.9	2.02	1592	1124.5	7.25	0.6		Cloudy
18/03/2021	Helicopter Support Facility	MW216	0089_MW216_210318			HydraSleeve	21	2.26	1753	1137.5	7.52	118.1		Clear
9/06/2021	Helicopter Support Facility	MW216	0089_MW216_210609			HydraSleeve	18.4	3.69	1753	1137.5	7.78	79.3		Cloudy
31/08/2021	Helicopter Support Facility	MW216	0089_MW216_210831			Hydrasleeve	22	3.77	2545	1657.5	7.73	7.6		Clear
18/12/2019	Helicopter Support Facility	MW217	0089_MW217_191218			HydroSleeve	21.7	4.8	332.1	230.75	7.23	25		
31/03/2020	Helicopter Support Facility	MW217	0089_MW217_200331	Hydrosleeve broken - hand bailed	103 and 303	HydroSleeve	23.5	6.59	483.2	272.25	8.04	-276.1		
22/07/2020	Helicopter Support Facility	MW217	0089_MW217_200722		114 and 214	HydroSleeve	22.8	5.86	637	429	7.62	-18.3		Clear
24/09/2020	Helicopter Support Facility	MW217	0089_MW217_200924			HydroSleeve	21.7	7.29	2381	1547	8.08	99.3		Cloudy
15/12/2020	Helicopter Support Facility	MW217	0089_MW217_201215			HydroSleeve	21.8	4.4	504	351	7.72	-7.8		Clear
18/03/2021	Helicopter Support Facility	MW217	0089_MW217_210318			HydraSleeve	22.5	4.33	958	624	7.58	61.4		Clear
9/06/2021	Helicopter Support Facility	MW217	0089_MW217_210609			HydraSleeve	19.3	6.87	733	474.5	8.12	61.3		Clear
31/08/2021	Helicopter Support Facility	MW217	0089_MW217_210831			Hydrasleeve	20.1	5.62	1170	760.5	7.57	-118.9		Clear,Cloudy
18/12/2019	Helicopter Support Facility	MW220		Dry										
31/03/2020	Helicopter Support Facility	MW220		Bore Dry										
22/07/2020	Helicopter Support Facility	MW220		Blocked w roots could not sample										
24/09/2020	Helicopter Support Facility	MW220		Dry										
15/12/2020	Helicopter Support Facility	MW220		DRY		HydroSleeve								Clear
18/03/2021	Helicopter Support Facility	MW220		Dry										
9/06/2021	Helicopter Support Facility	MW220	0089_MW220_210609	Only PFAS Sample collected. not enough water		HydraSleeve								Clear
31/08/2021	Helicopter Support Facility	MW220		Dry										
18/12/2019	Helicopter Support Facility	MW224	0089_MW224_191218			HydroSleeve	21.9	7.9	427.3	295.75	7.66	29.4		
31/03/2020	Helicopter Support Facility	MW224	0089_MW224_200331			HydroSleeve	20	5.75	794	484	7.22	-205.5		

Monitoring Date	Monitoring Area	LocationCode	Sample_ID	Observations	QC Dup Sample #	Purge Method	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Odour	Colour
22/07/2020	Helicopter Support Facility	MW224	0089_MW224_200722			HydroSleeve	20	5.15	826	591	7.65	10		
24/09/2020	Helicopter Support Facility	MW224	0089_MW224_200924			HydroSleeve	19.3	5.74	1788	1163.5	8.06	103.4		Cloudy
15/12/2020	Helicopter Support Facility	MW224	0089_MW224_201215			HydroSleeve	21	4.66	835	585	7.73	-6.8		Clear
18/03/2021	Helicopter Support Facility	MW224	0089_MW224_210318			HydraSleeve	21.1	4.49	894	578.5	7.84	65.1		Clear
9/06/2021	Helicopter Support Facility	MW224	0089_MW224_210609			HydraSleeve	18.5	6.51	860	559	8.04	74.7		Clear
31/08/2021	Helicopter Support Facility	MW224	0089_MW224_210831			Hydrasleeve	19.1	6.18	905	585	7.7	-11105		Clear,Cloudy
10/01/2020	Helicopter Support Facility	MW225	0089_MW225_200110	Dry										
31/03/2020	Helicopter Support Facility	MW225		Bore Dry										
22/07/2020	Helicopter Support Facility	MW225		DRY										
24/09/2020	Helicopter Support Facility	MW225		DRY										
15/12/2020	Helicopter Support Facility	MW225		Dry		HydroSleeve								Clear
17/03/2021	Helicopter Support Facility	MW225		Dry										
9/06/2021	Helicopter Support Facility	MW225		Dry		HydraSleeve								
1/09/2021	Helicopter Support Facility	MW225	0089_MW225_210901	Well blocked by fine sediment/sand. Unblocked and sampled with bailer		Hydrasleeve	18.2	2.26	2008	1306.5	7.6	-163.9		Cloudy,Black
14/01/2020	Helicopter Support Facility	MW226	0089_MW226_200114			HydroSleeve	25.4	6.15	43562	28145	7.17	-59		
2/04/2020	Helicopter Support Facility	MW226	0089_MW226_200402			HydroSleeve	22.2	5.29	40885	23710.5	6.92	-259.2		
21/07/2020	Helicopter Support Facility	MW226	0089_MW226_200721			HydroSleeve	18.7	12.22	37338	27638	7.11	-22.5		Cloudy
22/09/2020	Helicopter Support Facility	MW226	0089_MW226_200922			HydroSleeve	19.3	2.26	42211	26436.5	7.26	53		Clear
15/12/2020	Helicopter Support Facility	MW226	0089_MW226_201215			HydroSleeve	21.9	1.02	43297	28145	7.1	-40.2		Clear
17/03/2021	Helicopter Support Facility	MW226	0089_MW226_210317			HydraSleeve	23.2	1	44123	28678	7.09	-121.6		Clear,Yellow
10/06/2021	Helicopter Support Facility	MW226	0089_MW226_210610			HydraSleeve	20.8	0.9	43023	27966	7.16	-177.6		Clear
31/08/2021	Helicopter Support Facility	MW226	0089_MW226_210831			Hydrasleeve	19.7	2.42	43481	28268	7.52	-197.1		Clear
17/01/2020	Helicopter Support Facility	MW227		Not found - Location "unconfirmed" in Esdat										
1/04/2020	Helicopter Support Facility	MW227	0089_MW227_200401			Low_Flow	23.2	0.51	4461	3003	7.32	-220.5		Clear
22/07/2020	Helicopter Support Facility	MW227	0089_MW227_200722			HydroSleeve	17.6	4.38	3530	2671.5		-6.2		Clear
21/09/2020	Helicopter Support Facility	MW227	0089_MW227_200921			HydroSleeve	20.8	2.9	8134	5284.5	7.7	-205.8		Clear
15/12/2020	Helicopter Support Facility	MW227	0089_MW227_201215			HydroSleeve	21	1.1	3487		7.38	-100.6		Clear
15/03/2021	Helicopter Support Facility	MW227	0089_MW227_210315			HydraSleeve	21.6	0.61	5808	4030	7.92	-161.2		Clear,Cloudy
10/06/2021	Helicopter Support Facility	MW227	0089_MW227_210610			HydraSleeve	20.3	1.94	3101	2016	7.6	-186		Clear
31/08/2021	Helicopter Support Facility	MW227	0089_MW227_210831			Hydrasleeve	19.3	1.57	4600	2990	8.03	-135.6		Clear
14/01/2020	Helicopter Support Facility	MW228	0089_MW228_200114			HydroSleeve	25.8	5.48	24107	15327	7.49	-73.6		
1/04/2020	Helicopter Support Facility	MW228	0089_MW228_200401			Low_Flow	23.8	1.15	28530	19012.5	7.26	-38.6		Clear
22/07/2020	Helicopter Support Facility	MW228	0089_MW228_200722		QC112, QC212	HydroSleeve	18.2	2.2	15397	11511.5		11		Clear,Cloudy
21/09/2020	Helicopter Support Facility	MW228	0089_MW228_200921			HydroSleeve	19.9	2.25	31898	20735	7.22	-210.6		Clear
15/12/2020	Helicopter Support Facility	MW228	0089_MW228_201215			HydroSleeve	20	0.89	29607		7.2	-69.7		Clear
15/03/2021	Helicopter Support Facility	MW228	0089_MW228_210315			HydraSleeve	23.3	0.57	28133	18291	7.27	-11952		Cloudy
10/06/2021	Helicopter Support Facility	MW228	0089_MW228_210610			HydraSleeve	20.7	0.72	34475	22410	7.38	-121.5		Clear
31/08/2021	Helicopter Support Facility	MW228	0089_MW228_210831			Hydrasleeve	20.3	0.72	24402	15860	7.49	-64.5		Clear
18/12/2019	Helicopter Support Facility	MW282	0089_MW282_191218	DUP 1 taken here	QC101 QC201	HydroSleeve	23.4	5.08	222.1	289	6.96	149.9		Clear
31/03/2020	Helicopter Support Facility	MW282	0089_MW282_200331			HydroSleeve	21.5	3.55	1374	797.5	6.77	-274.8		
24/09/2020	Helicopter Support Facility	MW282	0089_MW282_200924			HydroSleeve	17.7	8.14	861	552	7.73	101		Cloudy
15/12/2020	Helicopter Support Facility	MW282	0089_MW282_201215			HydroSleeve	22.7	1.82	1198	812.5	6.96	3.2		Clear,Cloudy
18/03/2021	Helicopter Support Facility	MW282	0089_MW282_210318			HydraSleeve	23	0.97	1520	988	7.11	12.9		Clear
9/06/2021	Helicopter Support Facility	MW282	0089_MW282_210609			HydraSleeve	19.2	2.37	1339	871	7.42	80.7		Clear
31/08/2021	Helicopter Support Facility	MW282	0089_MW282_210831			Hydrasleeve	20	1.95	1003	650	7.21	-128.9		Cloudy,Brown
8/01/2020	Waste Water Treatment Plant	MW158	0089_MW158_200108			HydroSleeve								
31/03/2020	Waste Water Treatment Plant	MW158	0089_MW158_200331			HydroSleeve	21.3	1.34	13069	9126	7.24	-144.5		Clear
21/07/2020	Waste Water Treatment Plant	MW158	0089_MW158_200721			HydroSleeve	17.1	6.06	10131	7754.5		41.6		Clear
21/09/2020	Waste Water Treatment Plant	MW158	0089_MW158_200921			HydroSleeve	19.5	1.13	14358	9334	7.4	-85.8		Clear
14/12/2020	Waste Water Treatment Plant	MW158	0089_MW158_201214			HydroSleeve	20.5	1.96	12880	9152	7.33	-103.8		Clear
15/03/2021	Waste Water Treatment Plant	MW158	0089_MW158_210315	Dipper wasn't Working		HydraSleeve	22.4	1.49	16445	10692	7.3	45.6		Clear
10/06/2021	Waste Water Treatment Plant	MW158	0089_MW158_210610			HydraSleeve	21.1	1.93	14380	9347	7.76	-23.1		Clear
30/08/2021	Waste Water Treatment Plant	MW158	0089_MW158_210830	QC110/210	QC110/210	Hydrasleeve	19.7	2.51	13576	8827	7.25	101.4		Clear
8/01/2020	Waste Water Treatment Plant	MW161	0089_MW161_200108			HydroSleeve								
21/07/2020	Waste Water Treatment Plant	MW161	0089_MW161_200721			HydroSleeve	18.5	6.63	3034	2249		26.7		Clear
21/09/2020	Waste Water Treatment Plant	MW161	0089_MW161_200921			HydroSleeve	19.4	1.43	4048	2632.5	7.3	44.6		Clear
14/12/2020	Waste Water Treatment Plant	MW161	0089_MW161_201214			HydroSleeve	21.2	2.18	3354	2177	7.3	55.5		Brown
15/03/2021	Waste Water Treatment Plant	MW161	0089_MW161_210315			HydraSleeve	22.3	1.94	3843	2632.5	7.45	56.4		Clear,Cloudy
10/06/2021	Waste Water Treatment Plant	MW161	0089_MW161_210610			HydraSleeve	20.9	0.64	3886	2525	7.28	45.5		
30/08/2021	Waste Water Treatment Plant	MW161	0089_MW161_210830			Hydrasleeve	20.2	2.71	3193	2073.5	7.46	88.1		Clear
8/01/2020	Waste Water Treatment Plant	MW166	0089_MW166_200108			HydroSleeve							no	Clear
1/04/2020	Waste Water Treatment Plant	MW166	0089_MW166_200401			HydroSleeve	18.3	2.53	4328	3230.5	7.24	70.6		Clear
21/07/2020	Waste Water Treatment Plant	MW166	0089_MW166_200721			HydroSleeve	17.4	4.1	3556	2704		29.7		Clear
22/09/2020	Waste Water Treatment Plant	MW166	0089_MW166_200922			HydroSleeve	16.5	10.72	3972	2580.5	7.72	86.1		Clear
14/12/2020	Waste Water Treatment Plant	MW166	0089_MW166_201214	Hand bailed. Not enough water for hydrasleeve		HandBailing	19.8	1.36	3668	2645.5	7.33	-36.3		Clear
15/03/2021	Waste Water Treatment Plant	MW166	0089_MW166_210315	Mislabelled in COC as 127		HydraSleeve	26	1.74	5043	3282	7.41	28.8		
10/06/2021	Waste Water Treatment Plant	MW166	0089_MW166_210610			HydraSleeve	19.2	2.44	5572	3622	7.53	75.2		Clear
30/08/2021	Waste Water Treatment Plant	MW166	0089_MW166_210830			Hydrasleeve	19.6	1.07	3888	2528.5	7.4	43.5		Cloudy,Clear
1/04/2020	Waste Water Treatment Plant	MW169	0089_MW169_200401			HydroSleeve	18.4	3.66	3181	2366	7.36	59.8		Cloudy
1/04/2020	Waste Water Treatment Plant	MW171	0089_MW171_200401			HydroSleeve	20.7	6.2	14371	10172.5	7.25	84.3		Clear
21/07/2020	Waste Water Treatment Plant	MW171	0089_MW171_200721			HydroSleeve	17.9	2.53	3785	2847		-44.2		Clear,Brown
22/09/2020	Waste Water Treatment Plant	MW171		Dry										
14/12/2020	Waste Water Treatment Plant	MW171	0089_MW171_201214			HydroSleeve	19.3	1.77	6683	4324	7.11	-219.2	Hydrocarbon like odour	Clear
15/03/2021	Waste Water Treatment Plant	MW171	0089_MW171_210315			HydraSleeve	25.9	1.26	8569	5570.5	7.32	-226.5	Sulphur smell	Cloudy
10/06/2021	Waste Water Treatment Plant	MW171	0089_MW171_210610			HydraSleeve	19.9	0.83	15776	10258	10260	7.22		Clear
30/08/2021	Waste Water Treatment Plant	MW171	0089_MW171_210830			Hydrasleeve	19.6	2.14	10080	6552	7.3	-117.4		Clear
9/01/2020	Waste Water Treatment Plant	MW172	0089_MW172_200109	Dry										
1/04/2020	Waste Water Treatment Plant	MW172		Dry										
21/07/2020	Waste Water Treatment Plant	MW172		DRY										
22/09/2020	Waste Water Treatment Plant	MW172		Dry										
14/12/2020	Waste Water Treatment Plant	MW172		DRY		HydroSleeve								Clear
15/03/2021	Waste Water Treatment Plant	MW172		Dry										
10/06/2021	Waste Water Treatment Plant	MW172		Dry		HydraSleeve								
30/08/2021	Waste Water Treatment Plant	MW172		Dry										
16/01/2020	Waste Water Treatment Plant	MW173	0089_MW173_200116			HydroSleeve								
31/03/2020	Waste Water Treatment Plant	MW173	0089_MW173_200331			HydroSleeve	23	1.82	7064	4777.5	7.16	-147.7		Clear
22/07/2020	Waste Water Treatment Plant	MW173	0089_MW173_200722			HydroSleeve	20.2	5.35	3765	2697	7.59	-201	Rotten egg	Cloudy
22/09/2020	Waste Water Treatment Plant	MW173		DRY		HydroSleeve								
16/12/2020	Waste Water Treatment Plant	MW173		DRY		HydroSleeve								Clear
16/03/2021	Waste Water Treatment Plant	MW173	0089_MW173_210316	Bailer used due to shallow water	114, 214	HandBailing	24.6	1.5	3586	2333.5	7.53	-1900	Mild organic	Clear
10/06/2021	Waste Water Treatment Plant	MW173	0089_MW173_210610			HydraSleeve	21.8	0.53	4549	2957.5	7.23	-282.7	ammonia	Brown
30/08/2021	Waste Water Treatment Plant	MW173		Dry										
8/01/2020	Waste Water Treatment Plant	MW193	0089_MW193_200108	Bore not labelled		HydroSleeve	20.5	1.52	3789	2691	6.97	48.6		
31/03/2020	Waste Water Treatment Plant	MW193	0089_MW193_200331			HydroSleeve	22.5	2.47	4411	3003	7.24	-255.7		Black
15/07/2020	Waste Water Treatment Plant	MW193	0089_MW193_200715			HydroSleeve	19	5.88	3925		7.39	-49.2		Clear,Black

Monitoring Date	Monitoring Area	LocationCode	Sample_ID	Observations	QC Dup Sample #	Purge Method	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Odour	Colour
21/09/2020	Waste Water Treatment Plant	MW193		Dry		HydroSleeve								
16/12/2020	Waste Water Treatment Plant	MW193	0089_MW193_201216			HydroSleeve	21.4	1.42	3257	2275	7.08	-116.7		Clear
16/03/2021	Waste Water Treatment Plant	MW193	0089_MW193_210316	Hand bailed		HandBailing	26.8	1.14	3820	2548	7.23	-119		Clear
10/06/2021	Waste Water Treatment Plant	MW193	0089_MW193_210610			HydraSleeve	20.7	0.23	3135	2041	7.63	-220.2		Cloudy
30/08/2021	Waste Water Treatment Plant	MW193	0089_MW193_210830	QC113/213	QC113/213	Hydrasleeve	19.1	1.89	3759	2444	7.33	-86.2		Black
16/03/2021	Waste Water Treatment Plant	MW195D	0089_MW195D_210316	QC115, QC215	115, 215	HydraSleeve	23.5	0.72	30467	19812	7.5	-135		Clear
9/06/2021	Waste Water Treatment Plant	MW195D	0089_MW195D_210609	Weather rainy and overcast	QC112/212	HydraSleeve	17.4	2.91	26805	17413.5	8	-188.2	Slight sulfur	Cloudy
30/08/2021	Waste Water Treatment Plant	MW195D	0089_MW195D_210830	QC111/211	QC111/211	Hydrasleeve	19.6	0.97	30466	9805.5	7.5	-94.9		Clear
8/01/2020	Waste Water Treatment Plant	MW195-D	0089_MW195-D_200108	Bore labelled MW292_D		HydroSleeve	20.5	4.52	17425	2389	7.9	84.9		
31/03/2020	Waste Water Treatment Plant	MW195-D	0089_MW195-D_200331			HydroSleeve	21.9	0.44	25679	17680	7.47	-261.4		Cloudy
15/07/2020	Waste Water Treatment Plant	MW195-D	0089_MW195-D_200715			HydroSleeve	19.9	0.81	17155		7.68	-52.7		Clear
21/09/2020	Waste Water Treatment Plant	MW195-D	0089_MW195-D_200921			HydroSleeve	20.3	0.73	35243	22912.5	7.18	37.3		Cloudy,Black,Brown
16/12/2020	Waste Water Treatment Plant	MW195-D	0089_MW195-D_201216			HydroSleeve	21.2	1.25	34195	23991.5	7.43	-96.6		Clear,Cloudy
16/03/2021	Waste Water Treatment Plant	MW195S	0089_MW195S_210316			HydraSleeve	25.9	2.85	5102	3315	7.28	-38.5		Clear
9/06/2021	Waste Water Treatment Plant	MW195S	0089_MW195S_210609			HydraSleeve	18.9	2.54	5810	3763	7.78	-106.6		Cloudy
30/08/2021	Waste Water Treatment Plant	MW195S	0089_MW195S_210830			Hydrasleeve	19.9	1.88	5972	3880.5	7.32	1		Clear
8/01/2020	Waste Water Treatment Plant	MW195-S	0089_MW195-S_200108	Bore labelled MW292_I	QC102/202	HydroSleeve	21.2	3.17	4526	3272	7.24	86.5		
31/03/2020	Waste Water Treatment Plant	MW195-S	0089_MW195-S_200331			HydroSleeve	21.8	2.52	4976	3445	7.36	-175.2		Cloudy
15/07/2020	Waste Water Treatment Plant	MW195-S	0089_MW195-S_200715		QC	HydroSleeve	19.7	1.39	4189		7.35	33.3		Clear
21/09/2020	Waste Water Treatment Plant	MW195-S	0089_MW195-S_200921		QC108/208	HydroSleeve	20.4	0.38	9189	5973.5	7.06	-8		Black,Brown,Cloudy
16/12/2020	Waste Water Treatment Plant	MW195-S	0089_MW195-S_201216			HydroSleeve	21.2	3.05	4742	3321.5	7.31	-30.2		Clear
16/01/2020	Waste Water Treatment Plant	MW196	0089_MW196_200116	Dry										
2/04/2020	Waste Water Treatment Plant	MW196	0089_MW196_200402	Bore labelled as MB52	QC104& QC204	HandBailing	21.2	7.13	632	374	7.75	-211.3		
22/07/2020	Waste Water Treatment Plant	MW196	0089_MW196_200722			HydroSleeve	20.4	5.29	876	624	7.71	-109.1		Clear
24/09/2020	Waste Water Treatment Plant	MW196	0089_MW196_200924	Sampled with bailer. Hydrasleeve placed in well		HandBailing	18.6	7.38	746	487.5	7.78	35.3		Clear,Cloudy
16/12/2020	Waste Water Treatment Plant	MW196	0089_MW196_201216	Bailer used due to shallow water	QC116, QC216	HandBailing	20.6	2.26	614	435.5	7.64	-15.1		Clear
16/03/2021	Waste Water Treatment Plant	MW196		DRY										
10/06/2021	Waste Water Treatment Plant	MW196	0089_MW196_210610			Hand Bailer	20.8	4.27	690	448.5	8.32	93.3		Clear
30/08/2021	Waste Water Treatment Plant	MW196	0089_MW196_210830	QC112, QC212	QC112, QC212	Hydrasleeve	20.8	4.68	652	422.5	8.1	-148.7		Clear,Cloudy
9/01/2020	Waste Water Treatment Plant	MW197	0089_MW197_200109	Bore damaged by fallen tree- bent										
31/03/2020	Waste Water Treatment Plant	MW197	0089_MW197_200331			HydroSleeve	22	1.35	4865	3159	7.55	-46.2		Clear
15/07/2020	Waste Water Treatment Plant	MW197	0089_MW197_200715	Not enough water to take readings		HydroSleeve								
24/09/2020	Waste Water Treatment Plant	MW197		Dry										
15/12/2020	Waste Water Treatment Plant	MW197		Dry		HydroSleeve								Clear
16/03/2021	Waste Water Treatment Plant	MW197	0089_MW197_210316			HandBailing	23.5	2.95	7341	4771	7.61	4.5		Clear
9/06/2021	Waste Water Treatment Plant	MW197	0089_MW197_210609			HydraSleeve	18.5	2.84	7000	4511	8.05	60.1		Cloudy
1/09/2021	Waste Water Treatment Plant	MW197	0089_MW197_210901			Hydrasleeve	19.3	2.78	7303	4751	7.68	15.6		Clear
8/01/2020	Waste Water Treatment Plant	MW199	0089_MW199_200108			HydroSleeve	21.3	9.07	70.6	48.75	7.81	37.6		
31/03/2020	Waste Water Treatment Plant	MW199	0089_MW199_200331			HydroSleeve	23.4	3.68	21776	14774.5	7.21	-322.2	Very strong rotten egg smell	Cloudy,Clear
15/07/2020	Waste Water Treatment Plant	MW199	0089_MW199_200715			HydroSleeve	19	3.59	3345		7.69	106.1		Clear
21/09/2020	Waste Water Treatment Plant	MW199	0089_MW199_200921			HydroSleeve	19.7	2.9	21776		7.16	-202.3	Rotton egg	Clear
16/12/2020	Waste Water Treatment Plant	MW199	0089_MW199_201216	Broken Hydrasleeve replaced		HydroSleeve	22	2.31	4121	2840.5	7.54	-24.5		Clear
16/03/2021	Waste Water Treatment Plant	MW199	0089_MW199_210316	blocked less than 1 metre		HydraSleeve								
9/06/2021	Waste Water Treatment Plant	MW199	0089_MW199_210609	Well bent at approx 1.5m, unable to fix with steel bailer		HydraSleeve								Clear
30/08/2021	Waste Water Treatment Plant	MW199	0089_MW199_210830			Hydrasleeve	20.5	3.16	1292	838.5	7.67	-154.4		Clear
9/01/2020	Waste Water Treatment Plant	MW200	0089_MW200_200109			HydroSleeve							no	Clear
31/03/2020	Waste Water Treatment Plant	MW200	0089_MW200_200331			HydroSleeve	23.6	1.48	5697	3698.5	7.73	-37.1		Clear
15/07/2020	Waste Water Treatment Plant	MW200	0089_MW200_200715	Bore survey may be required		HydroSleeve	17.7	10.57	8090	6084	7.42	-49.5		Clear
24/09/2020	Waste Water Treatment Plant	MW200	0089_MW200_200924			HydroSleeve	20.8	4.97	9988	6493	8.06	17.1		Clear
15/12/2020	Waste Water Treatment Plant	MW200	0089_MW200_201215		Qc115/qc215	HydroSleeve	23.9	3.15	8837		7.66	-92.1		Clear
16/03/2021	Waste Water Treatment Plant	MW200	0089_MW200_210316			HydraSleeve	26.2	2.16	11389	7403.5	7.41	23.5		Clear
9/06/2021	Waste Water Treatment Plant	MW200	0089_MW200_210609			HydraSleeve	18.5	3.9	9354	6084	7.99	81.2		Clear
1/09/2021	Waste Water Treatment Plant	MW200	0089_MW200_210901			Hydrasleeve	18.1	2.32	7822	5083	7.89	44.1		Clear
17/01/2020	Waste Water Treatment Plant	MW202		Not found (Cardno, Jan 19) - Not located in February 2019 (GHD)										
31/03/2020	Waste Water Treatment Plant	MW202	0089_MW202_200331			HydroSleeve	22.9	1.64	1350	877.5	8.01	-120.4		Clear
22/07/2020	Waste Water Treatment Plant	MW202	0089_MW202_200722			HydroSleeve	17.6	4.37	1985	1501.5	7.69	6.5		Clear
21/09/2020	Waste Water Treatment Plant	MW202	0089_MW202_200921	Bailer used	QC112, QC212	HandBailing	17.7	2.24	981	741	7.48	111.3		Clear
16/12/2020	Waste Water Treatment Plant	MW202	0089_MW202_201216	sampled with bailer		HandBailing	21.5	1.64	1209	845	7.54	-14.5		Clear
15/03/2021	Waste Water Treatment Plant	MW202	0089_MW202_210315			HydraSleeve	21.4	8.8	1487	962	7.7	86.8		Clear
10/06/2021	Waste Water Treatment Plant	MW202	0089_MW202_210610			HydraSleeve	21.1	1.08	2432	4581	7.57	-36.4		Clear
30/08/2021	Waste Water Treatment Plant	MW202	0089_MW202_210830			Hydrasleeve	19.2	2.16	1493	968.5	7.6	-127.5		Clear
8/01/2020	Waste Water Treatment Plant	MW203	0089_MW203_200108			HydroSleeve								
31/03/2020	Waste Water Treatment Plant	MW203	0089_MW203_200331			HydroSleeve	22.8	1.3	1369	890.5	7.59	-36.2		Clear
15/07/2020	Waste Water Treatment Plant	MW203	0089_MW203_200715			HydroSleeve	19.4	1.84	1314		7.77	72.6		Clear
22/09/2020	Waste Water Treatment Plant	MW203	0089_MW203_200922			HydroSleeve	18.1	3.17	822	617.5	7.44	111.1		Clear
16/12/2020	Waste Water Treatment Plant	MW203	0089_MW203_201216			HydroSleeve	22.2	1.78	985	676	7.61	-18.8		Clear
16/03/2021	Waste Water Treatment Plant	MW203	0089_MW203_210316			HydraSleeve	23.8	1.97	1013	656.5	7.89	21		Clear
9/06/2021	Waste Water Treatment Plant	MW203	0089_MW203_210609			HydraSleeve	18.9	3.38	1010	656.5	8.09	-0.2		Clear
30/08/2021	Waste Water Treatment Plant	MW203	0089_MW203_210830			Hydrasleeve	21	5.44	835	546	7.81	-141.6		Clear,Cloudy,Brown

Monitoring Date	Monitoring Area	LocationCode	Sample_ID	Observations	QC Dup Sample #	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Odour	Colour
15/12/2020	Accommodation Area	PW346	0089_PW346_201215			23.3	0.3	18731	12174.5	7.61	-224.8		Clear
17/03/2021	Accommodation Area	PW346	0089_PW346_210317			30.5	0.37	46731	30355	6.96	19.5		Cloudy
9/01/2020	Demolition Ground	PW329	0089_PW329_200109			24.5	2.08	67738	4460	7.45	196.4		Clear
30/03/2020	Demolition Ground	PW329	0089_PW329_200330			22	1.72	56187	22725	6.79	-418.6	no	Clear
20/07/2020	Demolition Ground	PW329	0089_PW329_200720			15	9.23	18249	14670.5		14.4	no	Clear
23/09/2020	Demolition Ground	PW329	0089_PW329_200923			14.7	2.52	45149	36562	7.72	123.1	no	Clear
14/12/2020	Demolition Ground	PW329	0089_PW329_201214		202/102	22	1.09	54407		7.61	-69.7		Clear
16/03/2021	Demolition Ground	PW329	0089_PW329_210316		QC110, QC210	23.1	2.36	57859	37635	7.57	121		
8/06/2021	Demolition Ground	PW329	0089_PW329_210608		QC103/203	15.1	1.22	53614	34851	7.59	-84.4	no	Clear
30/08/2021	Demolition Ground	PW329	0089_PW329_210608			14.9	1.98	52022	33832	7.95	-12.6	no	Clear
9/01/2020	Demolition Ground	PW330	0089_PW330_200109			24.3	2.17	69074	5500	7.25	-188.5		Clear
30/03/2020	Demolition Ground	PW330	0089_PW330_200330		QC105 & QC205	22	1.82	54463	21680	7.07	-418.5	no	Clear
20/07/2020	Demolition Ground	PW330	0089_PW330_200720	0.4 to base of hole		15.1	6.18	18514	14800.5		15.5	no	Clear
22/09/2020	Demolition Ground	PW330	0089_PW330_200922			19	1.88	55768	36250.5	7.75	35.6	no	Clear
14/12/2020	Demolition Ground	PW330	0089_PW330_201214			22.6	1.08	54711		7.67	-94.2	Sulfuric odour	Clear
16/03/2021	Demolition Ground	PW330	0089_PW330_210316			24	0.81	57538	37375	7.67	-50.5		Clear
8/06/2021	Demolition Ground	PW330	0089_PW330_210608			14.8	2.87	53016	34461	7.21	155.5	no	Clear
30/08/2021	Demolition Ground	PW330	0089_PW330_210608			15.4	4.67	52755	34307	7.78	41.9	no	Clear
9/01/2020	Demolition Ground	PW331	0089_PW331_200109			25.7	4.99	32835	1053	7.48	-136.1		Clear
30/03/2020	Demolition Ground	PW331	0089_PW331_200330			22.2	1.94	50749	29370	7.01	-404.3	no	Clear
20/07/2020	Demolition Ground	PW331	0089_PW331_200720			15.7	6.52	18665	14735.5		14.7	no	Clear
23/09/2020	Demolition Ground	PW331	0089_PW331_200923			17.2	1.56	56304	336601	7.8	-8.3	no	Clear
14/12/2020	Demolition Ground	PW331	0089_PW331_201214		104/204	21.2	1.33	55666		7.61	-78.6		Clear
16/03/2021	Demolition Ground	PW331	0089_PW331_210316			24.9	1.6	58310	37895	7.59	-99.8		Clear
8/06/2021	Demolition Ground	PW331	0089_PW331_210608			15.8	2.18	54740	35582	6.68	94.9	no	Clear
30/08/2021	Demolition Ground	PW331	0089_PW331_210608			16.9	6.15	51797	33670	8.03	22.8	no	Clear
9/01/2020	Demolition Ground	PW356	0089_PW356_200109		QC102/202	23.5	6.05	60462	495	6.86	-259.1		Clear
30/03/2020	Demolition Ground	PW356	0089_PW356_200330			21.3	1.42	61435	26355	6.82	-389.9	no	Clear
20/07/2020	Demolition Ground	PW356	0089_PW356_200720	Pw at 0.3m		15.8	5.3	18666	14716		15	no	Clear
23/09/2020	Demolition Ground	PW356	0089_PW356_200923			17.5	1	55640	36166	7.55	-62	no	Clear
14/12/2020	Demolition Ground	PW356	0089_PW356_201214			20.5	1.08	54535		7.37	-33.6		Clear
16/03/2021	Demolition Ground	PW356	0089_PW356_210316			24.4	2.52	58190	37830	7.43	-29.2		Clear
8/06/2021	Demolition Ground	PW356	0089_PW356_210608			15.3	1.43	55052	35783	7.79	-89.8	no	Clear
30/08/2021	Demolition Ground	PW356	0089_PW356_210608			15.9	2.82	52187	33917	7.8	-68.1	no	Clear
9/01/2020	Demolition Ground	PW357	0089_PW357_200109		QC103/203	23.8	6.51	64613	2965	7.53	121.8		Clear
30/03/2020	Demolition Ground	PW357	0089_PW357_200330			22.4	3.24	54056	21130	7.13	-416.7	no	Clear
20/07/2020	Demolition Ground	PW357	0089_PW357_200720	0.3 to base of hole		14.6	6.87	18404	14942		16.2	no	Clear
23/09/2020	Demolition Ground	PW357	0089_PW357_200923			17.7	2.73	56372	36640.5	7.87	13.7	no	Clear
14/12/2020	Demolition Ground	PW357	0089_PW357_201214			21.2	1.44	54899		7.67	-89.2		Clear
16/03/2021	Demolition Ground	PW357	0089_PW357_210316			24.6	0.67	58069	37765	7.64	-117		Clear
8/06/2021	Demolition Ground	PW357	0089_PW357_210608			15.6	1.85	54595	35478	7.71	70.5	no	Clear
30/08/2021	Demolition Ground	PW357	0089_PW357_210608			15.5	2.09	52365	34040	7.88	40.3	no	Clear
9/01/2020	Demolition Ground	PW358	0089_PW358_200109			24.4	4.28	58439	8415	7.63	-94		Clear
30/03/2020	Demolition Ground	PW358	0089_PW358_200330			22.1	1.97	58689	24155	6.93	-418.7	no	Clear
20/07/2020	Demolition Ground	PW358	0089_PW358_200720			14.6	7.01	18115	14709.6		14.9	no	Clear
23/09/2020	Demolition Ground	PW358	0089_PW358_200923			15.5	3.88	45541	36458.5	7.82	109	no	Clear
14/12/2020	Demolition Ground	PW358	0089_PW358_201214			23.6	1.45	54471		7.63	-59		Clear
16/03/2021	Demolition Ground	PW358	0089_PW358_210316		QC113, QC213	23.2	1.33	57869	37635	7.71	69.9		Clear
8/06/2021	Demolition Ground	PW358	0089_PW358_210608		QC107/207	14.6	2.68	56302	36597	7.86	150.6	no	Clear
30/08/2021	Demolition Ground	PW358	0089_PW358_210608			16.1	2.28	52348	33943	7.86	3.7	no	Clear
8/01/2020	Dredge Spoil / Careening Bay	PW374	0089_PW374_200108		QC108/208	23.2	5.94	5007	3373	7.7	-87.8		Clear
30/03/2020	Dredge Spoil / Careening Bay	PW374	0089_PW374_200330		102 and 202	22.2	7.01	24093	15808	8.26	-26.7	no	Clear
21/07/2020	Dredge Spoil / Careening Bay	PW374	0089_PW374_200721			15.7	6.61	44268	34980	8.2	7.1	no	
21/09/2020	Dredge Spoil / Careening Bay	PW374	0089_PW374_200921		Qc103 /qc203	16.7	3.73	57017	37082.5	7.87	42.5	no	Clear
14/12/2020	Dredge Spoil / Careening Bay	PW374	0089_PW374_201214			22.3	3.67	57881		7.86	35.6		Clear
15/03/2021	Dredge Spoil / Careening Bay	PW374	0089_PW374_210315		QC106, QC206	25.3	3.51	58314	37895	7.97	28.9		Clear
10/06/2021	Dredge Spoil / Careening Bay	PW374	0089_PW374_210610			17.4	3.83	53469	34755.5	8.53	60.3	no	Clear
1/09/2021	Dredge Spoil / Careening Bay	PW374	0089_PW374_210610			15.9	5.73	52210	33936	8	-142.9	no	Clear
8/01/2020	Dredge Spoil / Careening Bay	PW375	0089_PW375_200108			22	2.59	42272	9146	7.91	-36.4		Clear
30/03/2020	Dredge Spoil / Careening Bay	PW375	0089_PW375_200330			21.7	5.61	51183	33345	8.16	-12.4	no	Clear
21/07/2020	Dredge Spoil / Careening Bay	PW375	0089_PW375_200721			14.7	6.09	43714	35347	8.02	9.9	no	
21/09/2020	Dredge Spoil / Careening Bay	PW375	0089_PW375_200921			16.5	3.55	56952	37024	8.01	36	no	
14/12/2020	Dredge Spoil / Careening Bay	PW375	0089_PW375_201214		Qc 109, qc 209	24	2.31	55851		7.78	-8.8		Clear
15/03/2021	Dredge Spoil / Careening Bay	PW375	0089_PW375_210315			23.9	3.34	57606	37505	8	23.7		Clear
10/06/2021	Dredge Spoil / Careening Bay	PW375	0089_PW375_210610		QC118/218	17.5	3.89	53567	34820.5	8.68	54.8	no	Clear
1/09/2021	Dredge Spoil / Careening Bay	PW375	0089_PW375_210610			15.8	5.27	52402	34060	7.94	-142.9	no	Clear
8/01/2020	Dredge Spoil / Careening Bay	PW378	0089_PW378_200108			22.3	4.87	47074	2272	7.9	-63.6		Clear
30/03/2020	Dredge Spoil / Careening Bay	PW378	0089_PW378_200330			22	5.99	51079	33345	8.23	-19.8	no	Clear
21/07/2020	Dredge Spoil / Careening Bay	PW378	0089_PW378_200721			16.1	4.95	43398	33956	7.95	4.8	no	
21/09/2020	Dredge Spoil / Careening Bay	PW378	0089_PW378_200921			15.4	4.6	56705	36855	7.97	31.1	no	Clear
14/12/2020	Dredge Spoil / Careening Bay	PW378	0089_PW378_201214			24.8	1.41	54510		7.76	-86.6		Clear
15/03/2021	Dredge Spoil / Careening Bay	PW378	0089_PW378_210315			23.5	2.54	57464	37310	7.93	31.7		Clear
10/06/2021	Dredge Spoil / Careening Bay	PW378	0089_PW378_210610			18.2	3.57	53363	34684	8.44	38.6	no	Clear
1/09/2021	Dredge Spoil / Careening Bay	PW378	0089_PW378_210610			16	5.75	52460	34099	7.95	-153.8	no	Clear
9/01/2020	Fire Training Area	PW335	0089_PW335_200109									no	Clear
30/03/2020	Fire Training Area	PW335	0089_PW335_200330			21		50171	35230	7.39	-56.8	no	Clear
15/07/2020	Fire Training Area	PW335	0089_PW335_200715	QC104/204		13.5	6.94	40653	33917	7.19	253.1	no	Clear
22/09/2020	Fire Training Area	PW335	0089_PW331_200923			17.7	1.23	55023	35763	7.65	-288	no	Clear
14/12/2020	Fire Training Area	PW335	0089_PW335_201214		QC105, QC205	21.9	0.53	52709	36465	7.48	-248.8		Clear

Monitoring Date	Monitoring Area	LocationCode	Sample_ID	Observations	QC Dup Sample #	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Odour	Colour
15/03/2021	Fire Training Area	PW335	0089_PW335_210315			20.3	2.09	53257	8025	7.48	-188.4	Salty	Clear
8/06/2021	Fire Training Area	PW335	0089_PW335_210608			14.6	0.69	53928	35052	7.58	-219.2	no	Clear
30/08/2021	Fire Training Area	PW335	0089_PW335_210608			15.8	3.57	52830	34339	7.8	-148.6	no	Clear
9/01/2020	Fire Training Area	PW340	0089_PW340_200109									no	Clear
30/03/2020	Fire Training Area	PW340	0089_PW340_200330			20.5	1.76	42669	30296.5	7.3	-61	no	Clear
15/07/2020	Fire Training Area	PW340	0089_PW340_200715			13.9	5.92	42386	34931	7.54	179.8	no	Cloudy
22/09/2020	Fire Training Area	PW340	0089_PW340_200922			18.8	1.04	56070	36439	7.81	-91.1	no	Clear
14/12/2020	Fire Training Area	PW340	0089_PW340_201214			20.8	0.27	56509	36725	7.5	-213.3		Clear
15/03/2021	Fire Training Area	PW340	0089_PW340_210315			21.1	1.59	62031	40300	7.51	78.4		
8/06/2021	Fire Training Area	PW340	0089_PW340_210608			14.5	1.3	52583	34177	7.98	-185.2	no	Clear
30/08/2021	Fire Training Area	PW340	0089_PW340_210608			15.9	1.91	51746	33637	7.72	-145.1	no	Clear
8/01/2020	Fire Training Area	PW341	0089_PW341_200108		Qc106/206	23.1	5.02	57353	38740	7.64	135.6	no	Clear
31/03/2020	Fire Training Area	PW341	0089_PW341_200331			20.6	1.45	48229	34209.5	7.1	-91.9	no	Clear
15/07/2020	Fire Training Area	PW341	0089_PW341_200715			14.2	5.35	41354	33845	7.24	-50	no	
22/09/2020	Fire Training Area	PW341	0089_PW341_200922		QC115/215	19.2	1.82	56627	36790	7.91	-61.4	no	Clear
14/12/2020	Fire Training Area	PW341	0089_PW341_201214			21.7	0.85	56361	36660	6.99	-76.5		Clear
15/03/2021	Fire Training Area	PW341	0089_PW341_210315			21.7	1.35	53674	37310	7.55	-26.4	Seawater smell	Clear,Cloudy
8/06/2021	Fire Training Area	PW341	0089_PW341_210608			13.9	1.46	54796	35620	7.92	-154.2	no	Clear
30/08/2021	Fire Training Area	PW341	0089_PW341_210608			16	2.42	50897	33091	7.76	-175.3	no	Clear
8/01/2020	Fire Training Area	PW362	0089_PW362_200108	No YSI reading taken									Clear
31/03/2020	Fire Training Area	PW362	0089_PW362_200331			23.5	1.15	53391	35620	7.33	-8.7	no	Clear
15/07/2020	Fire Training Area	PW362	0089_PW362_200715			14.5	4.22	43408	35262	7.61	178.3	no	Clear
22/09/2020	Fire Training Area	PW362	0089_PW362_200922			18.7	1.88	56809	36920	7.87	-33.9	no	Clear
14/12/2020	Fire Training Area	PW362	0089_PW362_201214			22.6	0.61	57404	37310	743	-141.6		Clear
15/03/2021	Fire Training Area	PW362	0089_PW362_210315			23.9	0.72	57350	37245	7.51	-179.6		Clear
8/06/2021	Fire Training Area	PW362	0089_PW362_210608			14.6	0.96	53285	34638	8.04	-163	no	Clear
30/08/2021	Fire Training Area	PW362	0089_PW362_210608			15.8	1.92	52304	34001.5	7.81	-148	no	Clear
8/01/2020	Fire Training Area	PW363	0089_PW363_200108			23.8	3.05	69188	46150	7.11	-129		Clear
31/03/2020	Fire Training Area	PW363	0089_PW363_200331		Qc101 and 201	21.5	2	33361	23218	7.41	-121.3	no	Clear
15/07/2020	Fire Training Area	PW363	0089_PW363_200715			13.9	2.81	41182	33956	7.48	-92.7	no	Clear
22/09/2020	Fire Training Area	PW363	0089_PW363_200922			19.9	1.38	55586	36140	7.91	-123.5	no	Clear
14/12/2020	Fire Training Area	PW363	0089_PW363_201214			213	4.51	24009	15606	755	920		Clear
15/03/2021	Fire Training Area	PW363	0089_PW363_210315			21.4	1.37	52385	365950	7.5	-97.9	Seawater	Clear
8/06/2021	Fire Training Area	PW363	0089_PW363_210608			14.3	1.26	54079	35152	7.8	-192.7	no	Clear
30/08/2021	Fire Training Area	PW363	0089_PW363_210608			15.7	1.71	50818	33033	7.76	-159.3	no	Clear
9/01/2020	Fire Training Area	PW364	0089_PW364_200109									no	Clear
30/03/2020	Fire Training Area	PW364	0089_PW364_200330			21.5	2.65	43880	30543.5	7.36	67.5	no	Clear
15/07/2020	Fire Training Area	PW364	0089_PW364_200715			13.5	10.07	41952	35015.5	6.84	284.3	no	Clear
22/09/2020	Fire Training Area	PW364	0089_PW364_200922			18	1.69	56579	36803	7.73	-132.4	no	Clear
14/12/2020	Fire Training Area	PW364	0089_PW364_201214			21.9	1.33	52723	36400	7.71	-116.1	Salty	Clear
15/03/2021	Fire Training Area	PW364	0089_PW364_210315			21.6	3.83	58261	37960	7.49	132		Clear
8/06/2021	Fire Training Area	PW364	0089_PW364_210608			14.1	1.15	54349	35323	7.77	-148.3	no	Clear
30/08/2021	Fire Training Area	PW364	0089_PW364_210608		QC106, QC206	15.7	1.99	51760	33644	7.71	-152.6	no	Clear
21/01/2020	Helicopter Support Facility	PW306	0089_PW306_200121										Clear
31/03/2020	Helicopter Support Facility	PW306	0089_PW306_200331			23.7	0.03	58295	32725	7.43	-410.8	no	Clear
22/07/2020	Helicopter Support Facility	PW306	0089_PW306_200722			17.3	7.65	18326	13981		23.3	no	Clear
23/09/2020	Helicopter Support Facility	PW306	0089_PW306_200923			16.1	19.39	55838	36322.5	7.84	76.2	no	Clear
15/12/2020	Helicopter Support Facility	PW306	0089_PW306_201215			23.7	0.71	55732		7.47	-228.6		Clear
17/03/2021	Helicopter Support Facility	PW306	0089_PW306_210317			24.5	1.16	58544	8025	7.6	33.8		Clear
9/06/2021	Helicopter Support Facility	PW306	0089_PW306_210609			15.9	4.23	54619	35500	7.95	55.7	no	Clear
31/08/2021	Helicopter Support Facility	PW306	0089_PW306_210609			18	6.13	52146	33917	7.57	29.9	no	Clear
21/01/2020	Helicopter Support Facility	PW307	0089_PW307_200121	No field parameters taken									Clear
31/03/2020	Helicopter Support Facility	PW307	0089_PW307_200331			25.1	4.82	55889	30415	7.74	-410.8	no	Clear
22/07/2020	Helicopter Support Facility	PW307	0089_PW307_200722			17.2	1.56	18913	14631.5		23	no	Clear
23/09/2020	Helicopter Support Facility	PW307	0089_PW307_200923			19.6	3.72	56666	36855	8.02	84.7	no	Clear
15/12/2020	Helicopter Support Facility	PW307	0089_PW307_201215			22.8	2.5	55544		7.73	69.1		Clear
17/03/2021	Helicopter Support Facility	PW307	0089_PW307_210317			23.8	3.87	58544	38025	8	65.9		Clear
9/06/2021	Helicopter Support Facility	PW307	0089_PW307_210609			15.5	4.86	54395	35362	8.07	45.7	no	Clear
31/08/2021	Helicopter Support Facility	PW307	0089_PW307_210609			17.6	5.36	53079	34502	8.04	-119.8	no	Clear
21/01/2020	Helicopter Support Facility	PW308	0089_PW308_200121	No field parameters taken									Clear
1/04/2020	Helicopter Support Facility	PW308	0089_PW308_200401			23.2	6.41	53096	30250	7.74	-321.9	no	Clear
22/07/2020	Helicopter Support Facility	PW308	0089_PW308_200722			17.1	7.55	18584	14209		12.3	no	Clear,Cloudy
23/09/2020	Helicopter Support Facility	PW308	0089_PW308_200923			17.5	7.67	47667	36133.5	8.15	81	no	Clear
15/12/2020	Helicopter Support Facility	PW308	0089_PW308_201215			23.4	3.33	55712		7.88	625		Clear
17/03/2021	Helicopter Support Facility	PW308	0089_PW308_210317			25.2	3.2	57750	37570	7.92	63.7		Clear
9/06/2021	Helicopter Support Facility	PW308	0089_PW308_210609			16.5	4.82	53704	34918	8.05	-9.1	no	Clear
31/08/2021	Helicopter Support Facility	PW308	0089_PW308_210609			20.6	7.64	51369	34092	8.11	72.7	no	Clear
21/01/2020	Helicopter Support Facility	PW314	0089_PW314_200121	Sample taken 1m closer to shoreline									Clear
31/03/2020	Helicopter Support Facility	PW314	0089_PW314_200331		QC107 & QC207	22.7	8.09	52861	30305	7.07	-385.6	no	Clear
22/07/2020	Helicopter Support Facility	PW314	0089_PW314_200722			18.1	6.09	18920	14163		15.9	no	Clear
23/09/2020	Helicopter Support Facility	PW314	0089_PW314_200923			17.8	1.28	56902	36978.5	7.91	74.6	no	Clear
15/12/2020	Helicopter Support Facility	PW314	0089_PW314_201215			25.7	1.56		55700	7.01	-312.9		Clear
17/03/2021	Helicopter Support Facility	PW314	0089_PW314_210317			24.3	3.11	60103	39065	7.66	59.9		Clear
9/06/2021	Helicopter Support Facility	PW314	0089_PW314_210609			15.5	4.12	54449	35399	7.96	42.8	no	Clear
31/08/2021	Helicopter Support Facility	PW314	0089_PW314_210609			18	4.46	53616	34840	7.9	-127.4	no	Clear
21/01/2020	Helicopter Support Facility	PW315	0089_PW315_200121	Taken 2m closer to shoreline									Clear
1/04/2020	Helicopter Support Facility	PW315	0089_PW315_200401			24.2	5.05	54607	30470	7.66	-328.4	no	Clear
22/07/2020	Helicopter Support Facility	PW315	0089_PW315_200722			16.6	5.71	18647	14443		16.5	no	Clear
23/09/2020	Helicopter Support Facility	PW315	0089_PW315_200923			16.6	5.14	46745	36302.5	7.91	82.5	no	Clear

Monitoring Date	Monitoring Area	LocationCode	Sample_ID	Observations	QC Dup Sample #	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Odour	Colour
17/03/2021	Helicopter Support Facility	PW315	0089_PW315_210317			25.1	3.54	57309	37245	7.89	66.9		Clear
9/06/2021	Helicopter Support Facility	PW315	0089_PW315_210609			15.2	4.76	54490	35419	8.05	31.1	no	Clear
31/08/2021	Helicopter Support Facility	PW315	0089_PW315_210609		QC116/216	18.2	10.97	1765	1198	7.94	80	no	Clear
EP2014090	Helicopter Support Facility	PW315	0089_PW315_201215			23.9	0.83	56808		6.71	-250.1		Clear
21/01/2020	Helicopter Support Facility	PW316	0089_PW316_200121	Taken 2m closer to shoreline, no field parameters taken									Clear
1/04/2020	Helicopter Support Facility	PW316	0089_PW316_200401			22.4	6.23	51650	29810	7.78	-323.1	no	Clear
22/07/2020	Helicopter Support Facility	PW316	0089_PW316_200722			17.6	7.3	18730	14157		9.6	no	Clear,Cloudy
23/09/2020	Helicopter Support Facility	PW316	0089_PW316_200923			16.8	10.81	47057	36289.5	8.02	83.5	no	Clear
15/12/2020	Helicopter Support Facility	PW316	0089_PW316_201215			23.4	3.22	56627		7.84	747		Cloudy
17/03/2021	Helicopter Support Facility	PW316	0089_PW316_210317			26.6	3.33	60123	39065	7.96	63		Clear
9/06/2021	Helicopter Support Facility	PW316	0089_PW316_210609			15.4	5.21	54614	35500	8.08	33.8	no	Clear
31/08/2021	Helicopter Support Facility	PW316	0089_PW316_210609			17.4	5.27	53034	34476	8.01	-157.9	no	Clear,Cloudy
14/01/2020	Helicopter Support Facility	PW405	0089_PW405_200114			26.6	2.84	63309	40040	7.64	-140.2		Clear
1/04/2020	Helicopter Support Facility	PW405	0089_PW405_200401			22.2	1.68	54864	37570	7.41	27.2	no	Clear
22/07/2020	Helicopter Support Facility	PW405	0089_PW405_200722			14.8	6.75	17134	13793		26.1	no	Clear
21/09/2020	Helicopter Support Facility	PW405	0089_PW405_200921		Qc110 / 210	17.1	1.3	56882	36965	7.74	-218.7	no	Clear
15/12/2020	Helicopter Support Facility	PW405	0089_PW405_201215			22.1	0.58	56353		7.61	-152.9		Clear
15/03/2021	Helicopter Support Facility	PW405	0089_PW405_210315			26.7	1.93	61893	38870	7.52	83.3		Clear
10/06/2021	Helicopter Support Facility	PW405	0089_PW405_210610		QC115/215	19.2	5.01	14825	9636	7.9	28.1	no	Clear
31/08/2021	Helicopter Support Facility	PW405	0089_PW405_210610		QC117, QC217	19.1	1.63	51865	33709	7.8	-139	no	Clear
14/01/2020	Helicopter Support Facility	PW407	0089_PW407_200114			26.2	4.62	59344	37570	7.62	-124.9		Clear
1/04/2020	Helicopter Support Facility	PW407	0089_PW407_200401			26.2	4.73	56090	35620	7.64	125.7	no	Clear
22/07/2020	Helicopter Support Facility	PW407	0089_PW407_200722			14.4	5.87	17196	14014		18.9	no	Clear
21/09/2020	Helicopter Support Facility	PW407	0089_PW407_200921			18.3	1.41	57061	57102	7.87	-199.4	no	Clear
15/12/2020	Helicopter Support Facility	PW407	0089_PW407_201215			24.3	0.46	58616		7.55	-131.7		Clear
15/03/2021	Helicopter Support Facility	PW407	0089_PW407_210315			25.8	4.61	56611	36790	7.88	45.1		Clear
10/06/2021	Helicopter Support Facility	PW407	0089_PW407_210610			18.8	5.41	25729	16725	7.94	-51	no	Clear
31/08/2021	Helicopter Support Facility	PW407	0089_PW407_210610			18.6	1.16	52860	34359	7.81	-136.7	no	Clear
14/01/2020	Helicopter Support Facility	PW409	0089_PW409_200114			28	3.44	34189	20956	7.47	-199		Clear
1/04/2020	Helicopter Support Facility	PW409	0089_PW409_200401			23.7	4.04	56653	37765	7.63	41.2	no	Clear
21/07/2020	Helicopter Support Facility	PW409	0089_PW409_200721			14	6.32	41000	33735	7.81	14.1	no	Clear
22/09/2020	Helicopter Support Facility	PW409	0089_PW409_200922		Qc113/213	17.7	1.18	56086	36459.5	7.8	-230.8	no	Clear
15/12/2020	Helicopter Support Facility	PW409	0089_PW409_201215			22.4	0.41	56691	36885	7.65	-137.3		Clear
17/03/2021	Helicopter Support Facility	PW409	0089_PW409_210317			30.7	3.34	59270	38545	7.57	67.5		Clear
10/06/2021	Helicopter Support Facility	PW409	0089_PW409_210610			18.2	4.24	53924	35049	8.1	29	no	Clear
31/08/2021	Helicopter Support Facility	PW409	0089_PW409_210610			18.9	1.58	53167	34586.5	7.81	-144.8	no	Clear
14/01/2020	Helicopter Support Facility	PW411	0089_PW411_200114			26.2	5.19	58636	37440	7.61	-80.7		Clear
1/04/2020	Helicopter Support Facility	PW411	0089_PW411_200401			21.7	6.89	44870	26070	7.48	-325	no	Clear
21/07/2020	Helicopter Support Facility	PW411	0089_PW411_200721			14.5	7.73	22957	18642	8.03	39.1	no	
22/09/2020	Helicopter Support Facility	PW411	0089_PW411_200922			18	1.1	56881	36973	7.82	-232.1	no	Clear
15/12/2020	Helicopter Support Facility	PW411	0089_PW411_201215			23.6	0.85	56869	36985	7.73	-109.8		Clear
18/03/2021	Helicopter Support Facility	PW411	0089_PW411_210318			25.5	3.71	57559	37375	7.6	46.4		Clear
9/06/2021	Helicopter Support Facility	PW411	0089_PW411_210609			14.8	4.07	54743	35584	7.85	65.5	no	Clear
1/09/2021	Helicopter Support Facility	PW411	0089_PW411_210609			15.9	5.81	52558	34164	7.83	-154.2	no	Clear
14/01/2020	Helicopter Support Facility	PW413	0089_PW413_200114			26.7	4.48	32515	20527	7.6	-157.2		Clear
1/04/2020	Helicopter Support Facility	PW413	0089_PW413_200401			22.8	5.04	38282	21956	7.19	-325.9	no	Clear
21/07/2020	Helicopter Support Facility	PW413	0089_PW413_200721			13.8	6.07	43485	35958	7.36	45.9	no	Clear
22/09/2020	Helicopter Support Facility	PW413	0089_PW413_200922			19	3.35	57590	37440	7.86	-198.4	no	Clear
15/12/2020	Helicopter Support Facility	PW413	0089_PW413_201215			22.9	0.44	56487	36725	7.7	-158.1		Clear
18/03/2021	Helicopter Support Facility	PW413	0089_PW413_210318			24.1	3.31	59350	38610	7.67	69.8		Clear
9/06/2021	Helicopter Support Facility	PW413	0089_PW413_210609			15.1	4.56	54691	3553	7.77	54.4	no	Clear
1/09/2021	Helicopter Support Facility	PW413	0089_PW413_210609			16.1	6.09	5103	33611	8.03	104.6	no	Clear
14/01/2020	Helicopter Support Facility	PW415	0089_PW415_200114			27.9	5.51	30883	9051	7.73	-70.8		Clear
1/04/2020	Helicopter Support Facility	PW415	0089_PW415_200401			23.7	7.59	23575	13277	7.43	-275.4	no	Clear
21/07/2020	Helicopter Support Facility	PW415	0089_PW415_200721			15.1	7.21	22268	17862	8.03	45.2	no	
22/09/2020	Helicopter Support Facility	PW415	0089_PW415_200922			19.3	1.56	57521	37375	7.86	-175.6	no	Clear
15/12/2020	Helicopter Support Facility	PW415	0089_PW415_201215			23.7	0.99	57175	37180	7.66	-25.3		Clear
18/03/2021	Helicopter Support Facility	PW415	0089_PW415_210318			24.9	3.78	39900	35928	7.86	66.9		Clear
9/06/2021	Helicopter Support Facility	PW415	0089_PW415_210609			15.1	5.52	54827	35640	7.83	37.5	no	Clear
1/09/2021	Helicopter Support Facility	PW415	0089_PW415_210609			16.6	6.27	52152	33897	7.98	87.4	no	Clear
8/01/2020	Waste Water Treatment Plant East	PW304	0089_PW304_200108			23.1	3.42	7.223	4875	7.64	-95.9		Clear
1/04/2020	Waste Water Treatment Plant East	PW304	0089_PW304_200401			20.3	1.8	11842	7696	7.58	-28.8	no	Clear
20/07/2020	Waste Water Treatment Plant East	PW304	0089_PW304_200720			18.5	1.22	14406	10686		-71.1	no	Clear,Black
22/09/2020	Waste Water Treatment Plant East	PW304	0089_PW304_200922			17.9	0.79	39723	25811.5	7.29	-302.9	no	Clear
15/12/2020	Waste Water Treatment Plant East	PW304	0089_PW304_201215			27	0.51	44353		7.24	-271.4		Clear
15/03/2021	Waste Water Treatment Plant East	PW304	0089_PW304_210315			20.8	1.17	48004	31206.5	7.32	2.9		
10/06/2021	Waste Water Treatment Plant East	PW304	0089_PW304_210610	Seaweed		18.5	4.7	33159	21547.5	7.76	85.6	no	Clear
1/09/2021	Waste Water Treatment Plant East	PW304	0089_PW304_210610			16.6	2.62	51304	33345	7.65	43.4	no	Clear
9/01/2020	Waste Water Treatment Plant East	PW345	0089_PW345_200109									no	Clear
31/03/2020	Waste Water Treatment Plant East	PW345	0089_PW345_200331			21	1.05	21748	14137.5	7.63	-30.3	no	Clear
15/07/2020	Waste Water Treatment Plant East	PW345		Not sampled. Covered by 1m of seaweed								no	
24/09/2020	Waste Water Treatment Plant East	PW345	0089_PW345_200924			18.5	0.75	57105	37115	7.35	-205.2	no	Clear
15/12/2020	Waste Water Treatment Plant East	PW345	0089_PW345_201215			24.5	0.56	60970		6.93	-303.4		Clear
16/03/2021	Waste Water Treatment Plant East	PW345	0089_PW345_210316			25.7	1.31	53528	34840	7.08	-13.8		Clear
9/06/2021	Waste Water Treatment Plant East	PW345	0089_PW345_210609			15.6	6.59	51954	33793	7.98	107.2	no	Cloudy
1/09/2021	Waste Water Treatment Plant East	PW345	0089_PW345_210609			15.7	1.34	41671	27085.5	6.99	-214.3	no	Clear,Brown
8/01/2020	Waste Water Treatment Plant East	PW346	0089_PW346_200108			24.6	4.83	20522	3754	7.36	-262		Clear
1/04/2020	Waste Water Treatment Plant East	PW346	0089_PW346_200401			23.9	2	58694	38155	6.96	-292	no	Clear
15/07/2020	Waste Water Treatment Plant East	PW346	0089_PW346_200715			16	4.27	20001		8.14	76.8	no	Clear

Monitoring Date	Monitoring Area	LocationCode	Sample_ID	Observations	QC Dup Sample #	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Odour	Colour
22/09/2020	Waste Water Treatment Plant East	PW346	0089_PW346_200922			20.8	1.84	30121	29552	7.5	-189.9	no	
10/06/2021	Waste Water Treatment Plant East	PW346	0089_PW346_210610	Lots of seaweed		19.3	0.83	51243	33312.5	8.13	34.9	no	Clear
30/08/2021	Waste Water Treatment Plant East	PW346	0089_PW346_210610	Clear water		17.1	2.81	50379	32747	7.65	-194.7	no	Clear
8/01/2020	Waste Water Treatment Plant East	PW367	0089_PW367_200108			23.4	3.24	41500	8411	6.84	-340.3		Clear
31/03/2020	Waste Water Treatment Plant East	PW367	0089_PW367_200331			20.3	1.45	31446	20442.5	7.42	-13.4	no	Clear
15/07/2020	Waste Water Treatment Plant East	PW367	0089_PW367_200715			14.6	7.22	43502	35288	7.62	-26	no	
22/09/2020	Waste Water Treatment Plant East	PW367	0089_PW367_200922			19	1.17	57337	37245	7.66	-272.9	no	Clear
15/12/2020	Waste Water Treatment Plant East	PW367	0089_PW367_201215			26.1	0.56	55209		7.16	-228.1		Clear
15/03/2021	Waste Water Treatment Plant East	PW367	0089_PW367_210315			22.2	0.26	59018	38415	7.24	-263		Clear
9/06/2021	Waste Water Treatment Plant East	PW367	0089_PW367_210609			15.3	4.66	54591	35477	8.05	95	no	Cloudy
1/09/2021	Waste Water Treatment Plant East	PW367	0089_PW367_210609			16.7	2.17	49987	32500	7.46	9.9	no	Clear
8/01/2020	Waste Water Treatment Plant East	PW368	0089_PW368_200108			22.7	1.9	41833	8346	7.65	-110.7		Clear
1/04/2020	Waste Water Treatment Plant East	PW368	0089_PW368_200401			19.5	0.91	45991	29913	7.62	-41.4	no	Clear
20/07/2020	Waste Water Treatment Plant East	PW368	0089_PW368_200720			16.3	4.51	17792	13721.5		0.8	no	Clear
22/09/2020	Waste Water Treatment Plant East	PW368	0089_PW368_200922			18.5	0.72	39335	25571	7.64	-237.9	no	
15/12/2020	Waste Water Treatment Plant East	PW368	0089_PW368_201215			23.6	2.04	47485		7.44	-258.5		Clear
15/03/2021	Waste Water Treatment Plant East	PW368	0089_PW368_210315		QC202, QC102	23.9	0.69	57703	37505	7.65	7.9		Clear
10/06/2021	Waste Water Treatment Plant East	PW368	0089_PW368_210610			19.4	5.95	39536	25694.5	8	76.1	no	Clear
1/09/2021	Waste Water Treatment Plant East	PW368	0089_PW368_210610			16.6	5.05	51073	33221	7.46	91.8	no	Clear
9/01/2020	Waste Water Treatment Plant East	PW369	0089_PW369_200109									no	Clear
31/03/2020	Waste Water Treatment Plant East	PW369	0089_PW369_200331			22.1	2.07	18013	11719.5	7.36	-18.1	no	Clear
15/07/2020	Waste Water Treatment Plant East	PW369	0089_PW369_200715			14.8	7.73	43326	34989	7.5	4.1	no	
24/09/2020	Waste Water Treatment Plant East	PW369	0089_PW369_200924			19.1	8.17	56648	36790	7.47	-2.3	no	Clear
15/12/2020	Waste Water Treatment Plant East	PW369	0089_PW369_201215	Labelled SW368 in CoC		24.2	0.65	56933		7.44	-238.5		Clear
16/03/2021	Waste Water Treatment Plant East	PW369	0089_PW369_210316			23.6	0.77	57841	37570	7.38	-55		Clear
9/06/2021	Waste Water Treatment Plant East	PW369	0089_PW369_210609	Lots of seaweed on beach		16.1	5.59	53760	34944	8.08	101.1	no	Cloudy
1/09/2021	Waste Water Treatment Plant East	PW369	0089_PW369_210609		QC118, QC218	16.5	6.38	24706	16061	6.82	-100.5	no	Brown,Clear
30/01/2020	Waste Water Treatment Plant West	PW350	0089_PW350_200130										Clear
21/07/2020	Waste Water Treatment Plant West	PW350	0089_PW350_200721			16.5	6.8	18303	14189.5		23.1	no	Clear
23/09/2020	Waste Water Treatment Plant West	PW350	0089_PW350_200923			17.5	6.23	56574	36770.5	8.12	84.8	no	Clear
16/12/2020	Waste Water Treatment Plant West	PW350	0089_PW350_201216			22.5	1.52	57539		7.62	61.9		Clear
17/03/2021	Waste Water Treatment Plant West	PW350	0089_PW350_210317			23.8	3.87	58595	36090	7.53	98.8		Clear
8/06/2021	Waste Water Treatment Plant West	PW350	0089_PW350_210608			19.1	4.05	55302	35964	8.06	-8.8	no	Clear
30/08/2021	Waste Water Treatment Plant West	PW350	0089_PW350_210608			17.2	6	52311	34001.5	8.05	86.1	no	Clear
30/01/2020	Waste Water Treatment Plant West	PW351	0089_PW351_200130										Clear
2/04/2020	Waste Water Treatment Plant West	PW351	0089_PW351_200402			22.7	9.25	56049	35400	8.08	152.7	no	Cloudy
21/07/2020	Waste Water Treatment Plant West	PW351	0089_PW351_200721			17	3.53	18736	14384		19	no	Clear
24/09/2020	Waste Water Treatment Plant West	PW351	0089_PW351_200924			17.6	6.66	56307	36601.5	8.28	75.5	no	Clear
16/12/2020	Waste Water Treatment Plant West	PW351	0089_PW351_201216	labelled PW330 in CoC		23.5	4.1	55060		7.91	60.3		Clear
17/03/2021	Waste Water Treatment Plant West	PW351	0089_PW351_210317			23.4	3.19	56494	36725	7.7	111.2		Clear
8/06/2021	Waste Water Treatment Plant West	PW351	0089_PW351_210608			17.8	5.19	54474	35408	8.1	53.4	no	Clear
30/08/2021	Waste Water Treatment Plant West	PW351	0089_PW351_210608			17.1	5.94	52547	34157.5	8.12	66.8	no	Clear
30/01/2020	Waste Water Treatment Plant West	PW352	0089_PW352_200130										Clear
2/04/2020	Waste Water Treatment Plant West	PW352	0089_PW352_200402			22.6	4.93	52997	36075	8.08	148.2	no	Clear
21/07/2020	Waste Water Treatment Plant West	PW352	0089_PW352_200721			17.3	7.11	18624	14189.5		10.7	no	Clear
24/09/2020	Waste Water Treatment Plant West	PW352	0089_PW352_200924			18.1	5.48	56425	36679.5	8.16	59.5	no	Clear
16/12/2020	Waste Water Treatment Plant West	PW352	0089_PW352_201216			21.3	5	54903		7.39	91.3		Clear
17/03/2021	Waste Water Treatment Plant West	PW352	0089_PW352_210317			24	4.34	56595	36790	7.91	73.1		Clear
8/06/2021	Waste Water Treatment Plant West	PW352	0089_PW352_210608			16.9	5.76	54512	35433	8.09	38.8	no	Clear
30/08/2021	Waste Water Treatment Plant West	PW352	0089_PW352_210608			18.4	5.42	52492	34118.5	8.12	98.3	no	Clear
30/01/2020	Waste Water Treatment Plant West	PW380	0089_PW380_200130										Clear
2/04/2020	Waste Water Treatment Plant West	PW380	0089_PW380_200402			22.7	9.25	56049	36400	8.1	152.7	no	Clear
21/07/2020	Waste Water Treatment Plant West	PW380	0089_PW380_200721			16.4	5.27	18484	14378		7.3	no	Clear
24/09/2020	Waste Water Treatment Plant West	PW380	0089_PW380_200924			17.1	6.66	56307	36601.5	8.28	75.5	no	Clear
16/12/2020	Waste Water Treatment Plant West	PW380	0089_PW380_201216			23.4	4.6	55051	5815	7.93	60.3		Clear
17/03/2021	Waste Water Treatment Plant West	PW380	0089_PW380_210317			24.2	4.34	59060	38415	7.76	108.2		Clear
8/06/2021	Waste Water Treatment Plant West	PW380	0089_PW380_210608			18.5	4.75	54758	35593	8	43.4	no	Clear
30/08/2021	Waste Water Treatment Plant West	PW380	0089_PW380_210608			17.3	5.43	52878	34372	8.11	67.3	no	Clear
30/01/2020	Waste Water Treatment Plant West	PW381	0089_PW381_200130										Clear
2/04/2020	Waste Water Treatment Plant West	PW381	0089_PW381_200402			22.5	3.81	53296	36335	8.08	143.1	no	Clear
2/04/2020	Waste Water Treatment Plant West	PW381	0089_PW381_200402			23.1	6.61	3425	2223	7.93	140.3	no	Clear
21/07/2020	Waste Water Treatment Plant West	PW381	0089_PW381_200721			17.7	4.43	18712	14137.5		11.3	no	Clear
24/09/2020	Waste Water Treatment Plant West	PW381	0089_PW381_200924			17.5	6.43	56340	36621	8.29	64.3	no	Clear
16/12/2020	Waste Water Treatment Plant West	PW381	0089_PW381_201216			22.6	3.35	56056		7.92	60.7		Clear
17/03/2021	Waste Water Treatment Plant West	PW381	0089_PW381_210317			24	3.59	56218	36530	7.85	104.5		Clear
8/06/2021	Waste Water Treatment Plant West	PW381	0089_PW381_210608			17.8	4.69	54811	35627	8.19	-6	no	Clear
30/08/2021	Waste Water Treatment Plant West	PW381	0089_PW381_210608			17.4	5.78	52556	34151	8.14	63	no	Clear
30/01/2020	Waste Water Treatment Plant West	PW401	0089_PW401_200130										Clear
2/04/2020	Waste Water Treatment Plant West	PW401	0089_PW401_200402			22.3	5.02	55612	36205	8.3	162	no	Clear
21/07/2020	Waste Water Treatment Plant West	PW401	0089_PW401_200721			17.2	6.01	18593	14202		14.6	no	Clear
23/09/2020	Waste Water Treatment Plant West	PW401	0089_PW401_200923			17	6.52	56484	36715	8.21	79.8	no	Clear
16/12/2020	Waste Water Treatment Plant West	PW401	0089_PW401_201216			22.5	3.3	56682	36855	7.45	65.9		Clear
17/03/2021	Waste Water Treatment Plant West	PW401	0089_PW401_210317			24	4.41	53025	34450	7.76	107.4		Clear
8/06/2021	Waste Water Treatment Plant West	PW401	0089_PW401_210608			18.2	5.21	54562	35465	7.28	40	no	Clear
30/08/2021	Waste Water Treatment Plant West	PW401	0089_PW401_210608			17.3	6.31	52291	33988.5	8.1	67.9	no	Clear

Monitoring Area	Date	Location Code	Sample ID	Sampling Method	Sample Depth (m)	WaterBody Depth (m)	Observations/QC	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Water Colour	Turbidity
Fire Training Area	8/01/2020	SW130	0089_SW130_200108	Direct_into_Bottle	0.1	1	No ysi reading							Clear	Low
Fire Training Area	30/03/2020	SW130	0089_SW130_200330	Direct_into_Bottle	0.1	0.5		23.4	3.6	54247	36335	7.94	25.6	Clear	Medium
Fire Training Area	15/07/2020	SW130	0089_SW130_200715	Direct_into_Bottle	0.2	1.00		14.8	7.16	43600	35191	7.99	132.5	Clear	Low
Fire Training Area	22/09/2020	SW130	0089_SW130_200922	Direct_into_Bottle	0.4	0.5		19.5	5.02	55328	35964.5	8.05	36.2	Clear	Low
Fire Training Area	14/12/2020	SW130	0089_SW130_201214	Direct into Bottle	0.1	1.2		21.9	3.62	52321	36140	8.05	-66.6	Clear	Low
Fire Training Area	15/03/2021	SW130	0089_SW130_210315	Direct into Bottle	0.1			24	3.45	56478	36725	8.08	33.1	Clear	
Fire Training Area	8/01/2020	SW132	0089_SW132_200108	Direct_into_Bottle	0.1	1	No YSI reading							Clear	Low
Fire Training Area	30/03/2020	SW132	0089_SW132_200330	Direct_into_Bottle	0.1	0.5		24.2	4.17	55199	36455	8.03	55.6	Clear	Medium
Fire Training Area	15/07/2020	SW132	0089_SW132_200715	Direct_into_Bottle	0.2	1.00	QC103/203	14.5	7.54	43302	35256	7.99	107.8	Clear	
Fire Training Area	22/09/2020	SW132	0089_SW132_200922	Direct_into_Bottle	0.6	1		20.8	4.42	55837	36270	8.15	-3.1	Clear	Low
Fire Training Area	14/12/2020	SW132	0089_SW132_201214	Direct into Bottle	0.1	0.6	QC107 / QC207 SW taken here	21.2	4.71	56632	36790	8.02	15.5	Clear	Low
Fire Training Area	15/03/2021	SW132	0089_SW132_210315	Direct into Bottle	0.1	1		22.3	3.93	52769	36140	7.81	7.2	Clear/brown	Low
Fire Training Area	8/01/2020	SW134	0089_SW134_200108	Direct_into_Bottle	0.1	1	No reading taken. Qc109/209							Clear	Low
Fire Training Area	31/03/2020	SW134	0089_SW134_200331	Direct_into_Bottle	0.1	0.5	QC101 & QC201 taken here	22	3.52	52423	36140	7.92	57.8	Clear	Medium
Fire Training Area	15/07/2020	SW134	0089_SW134_200715	Direct_into_Bottle	0.2	1.00		14.6	11.79	43369	35178	7.73	113.9	Clear	Low
Fire Training Area	22/09/2020	SW134	0089_SW134_200922	Direct_into_Bottle	0.6	1	QC116/216	21.6	5.34	55680	36205	8.26	31.6	Clear	Low
Fire Training Area	14/12/2020	SW134	0089_SW134_201214	Direct into Bottle	0.1	0.5		21.9	4.15	56544	36790	7.98	-40.1	Clear	Low
Fire Training Area	15/03/2021	SW134	0089_SW134_210315	Direct into Bottle	0.1	1		21.4	3.97	51889	36205	7.93	20.1	Clear	Low
Demolition Ground	8/01/2020	SW150	0089_SW150_200108	Direct_into_Bottle	0.1	1		25.8	5.9	57907	37050	8.18	42.2	Clear	Low
Demolition Ground	30/03/2020	SW150	0089_SW150_200330	Direct_into_Bottle	0.1			23.7	5.94	52364	29480	7.8	-384		
Demolition Ground	20/07/2020	SW150	0089_SW150_200720	Direct_into_Bottle	0	1.00		17	6.88	18540	14196		21.3	Clear	High
Demolition Ground	23/09/2020	SW150	0089_SW150_200923	Direct_into_Bottle	0.1	0.6		15.5	9.43	45427	36088	8.23	91.3	Clear	Low
Demolition Ground	14/12/2020	SW150	0089_SW150_201214	Direct into Bottle	0.4	0.3		22.1	4.72			8.03	48	Clear	Low
Demolition Ground	16/03/2021	SW150	0089_SW150_210316	Direct into Bottle	0.1	0.2		24.9	4.19	57163	37245	8.02	5.1	clear	Low
Demolition Ground	8/01/2020	SW152	0089_SW152_200108	Direct_into_Bottle	0.1			25.6	4.84	58077	37180	8.2	27.5	Clear	Low
Demolition Ground	30/03/2020	SW152	0089_SW152_200330	Direct_into_Bottle	0.1			24.2	5.52	52771	29425	7.82	-369.3		
Demolition Ground	20/07/2020	SW152	0089_SW152_200720	Direct_into_Bottle	0	1.00		18.2	6.27	18667	13942.5		15.8	Clear	High
Demolition Ground	23/09/2020	SW152	0089_SW152_200923	Direct_into_Bottle	0.1	0.6		15.2	11.58	45153	36133.5	8.19	93.9	Clear	Low
Demolition Ground	14/12/2020	SW152	0089_SW152_201214	Direct into Bottle	0.2	0.8		23.4	4.95	55960		8.02	135.4	Clear	Low
Demolition Ground	16/03/2021	SW152	0089_SW152_210316	Direct into Bottle	0.1	0.2		24.2	3.11	54842	35815	7.73	3.1	clear	
Demolition Ground	8/01/2020	SW154	0089_SW154_200108	Direct_into_Bottle	0.1	1	QC104/201	24.6	4.13	56911	36985	8.2	25.6	Clear	Low
Demolition Ground	30/03/2020	SW154	0089_SW154_200330	Direct_into_Bottle	0.1			23.3	6.78	51950	29425	7.78	-369	Clear	Medium
Demolition Ground	20/07/2020	SW154	0089_SW154_200720	Direct_into_Bottle	0	1.00		16.8	6.27	18529	14280.5		20.9	Clear	Medium
Demolition Ground	22/09/2020	SW154	0089_SW154_200922	Direct_into_Bottle	0.3	1		20.9	5.34	55703	36205	8.26	41.1	Clear	Low
Demolition Ground	14/12/2020	SW154	0089_SW154_201214	Direct into Bottle	0.1	0.6		23.4	5.54	55380		8.05	34.5	Clear	Low
Demolition Ground	16/03/2021	SW154	0089_SW154_210316	Direct into Bottle	0.1	0.2		23	3.35	57373	37310	8.06	72.5	clear	Low
Demolition Ground	8/01/2020	SW156	0089_SW156_200108	Direct_into_Bottle				24.8	5.6	56063	36465	8.11	19.3	Clear	Low
Demolition Ground	30/03/2020	SW156	0089_SW156_200330	Direct_into_Bottle	0.1	0.6		23.5	5.1	52157	29535	7.68	-397.7	Clear - ocean	Low
Demolition Ground	20/07/2020	SW156	0089_SW156_200720	Direct_into_Bottle	0	1.00		16.9	6.26	18577	14287		17.6	Clear	Medium
Demolition Ground	23/09/2020	SW156	0089_SW156_200923	Direct_into_Bottle	0.1	0.6		14.6	10.99	44567	36062	8.16	116.4	Clear	Medium
Demolition Ground	14/12/2020	SW156	0089_SW156_201214	Direct into Bottle	0.2	0.5		23.6	3.43	55331		8.04	49.5	Clear	Low
Demolition Ground	16/03/2021	SW156	0089_SW156_210316	Direct into Bottle	0.1	0.2	QC111/211	22.4	2.9	57392	37310	8.02	95	clear	Low
Waste Water Treatment Plant East	8/01/2020	SW305	0089_SW305_200108	Direct_into_Bottle				36.2	6.01	53542	3995	8.16	21.2	Clear	Low
Waste Water Treatment Plant East	31/03/2020	SW305	0089_SW305_200331	Direct_into_Bottle	0.1	0.2		24.2	5.01	55805	36270	8.04	26	Clear	Low
Waste Water Treatment Plant East	20/07/2020	SW305	0089_SW305_200720	Direct_into_Bottle	0	1.2		16.9	7.35	18674	14365		15.7	Clear	Low
Waste Water Treatment Plant East	22/09/2020	SW305	0089_SW305_200922	Direct_into_Bottle	0.1	0.2		20.6	6.41	54670	35555	8.19	-131.4	Clear	Low
Waste Water Treatment Plant East	15/12/2020	SW305	0089_SW305_201215	Direct into Bottle	0.6	1		26.2	5.78	54290		8.17	-120	Clear	Low
Waste Water Treatment Plant East	15/03/2021	SW305	0089_SW305_210315	Direct into Bottle	0.1	0.2		21.4	4.11	56985	37050	7.88	36.5	clear	Low
Helicopter Support Facility	21/01/2020	SW309	0089_SW309_200121	Direct_into_Bottle			Ocean water QC101/201							Clear	Low
Helicopter Support Facility	31/03/2020	SW309	0089_SW309_200331	Direct_into_Bottle	0.5	1.2		22.8	7.01	52327	30030	7.91	-409.6	Clear	Low
Helicopter Support Facility	22/07/2020	SW309	0089_SW309_200722	Direct_into_Bottle	0	1.0		18	8.2	18803	14118		11.8	Clear	Medium
Helicopter Support Facility	23/09/2020	SW309	0089_SW309_200923	Direct_into_Bottle	0.6	1		19.7	7.21	56248	36530	8.43	82.4	Clear	Low
Helicopter Support Facility	15/12/2020	SW309	0089_SW309_201215	Direct into Bottle	0.2	0.8	Qc112/212	23.9	0.04	56055		7.44	-284.6	Clear	Medium
Helicopter Support Facility	17/03/2021	SW309	0089_SW309_210317	Direct into Bottle	0.1	0.2		25.2	4.04	57314		8.21	55.2	Clear	Low
Helicopter Support Facility	21/01/2020	SW310	0089_SW310_200121	Direct_into_Bottle			No field parameters taken							Clear	Low

Helicopter Support Facility	31/03/2020	SW310	0089_SW310_200331	Direct_into_Bottle	0.1			23.4	8.11	53515	30360	7.83	-411.5	Clear	Medium
Helicopter Support Facility	22/07/2020	SW310	0089_SW310_200722	Direct_into_Bottle	0	1.0		18.1	6.24	18770	14046.5		9.9	Clear	Medium
Helicopter Support Facility	23/09/2020	SW310	0089_SW310_200923	Direct_into_Bottle	0.5	1		19.8	5.74	56288	36595	8.38	92.4	Clear	Low
Helicopter Support Facility	15/12/2020	SW310	0089_SW310_201215	Direct into Bottle	0.1	0.3		23.4	3.42	55586		7.91	-213.3	Clear	Medium
Helicopter Support Facility	17/03/2021	SW310	0089_SW310_210317	Direct into Bottle	0.1	0.2		25.1	3.66	57553	37440	8.16	61.6	clear	Low
Helicopter Support Facility	21/01/2020	SW311	0089_SW311_200121	Direct_into_Bottle		No field parameters taken								Clear	Low
Helicopter Support Facility	1/04/2020	SW311	0089_SW311_200401	Direct_into_Bottle	0.1			22.9	0.01	52743	30195	7.77	-328.8	Clear	Low
Helicopter Support Facility	22/07/2020	SW311	0089_SW311_200722	Direct_into_Bottle	0	1.0		17.5	6.09	18624	14131		8.6	Clear	Medium
Helicopter Support Facility	23/09/2020	SW311	0089_SW311_200923	Direct_into_Bottle	0.8	1		19.8	6.38	55922	36335	8.39	93.4	Clear	Low
Helicopter Support Facility	15/12/2020	SW311	0089_SW311_201215	Direct into Bottle	0.3	0.5		23.2	4.98	55470		8.07	65	Clear	Low
Helicopter Support Facility	17/03/2021	SW311	0089_SW311_210317	Direct into Bottle	0.1	0.2		24.8	3.17	57531	37440	8.1	55.5	clear	Low
Dredge Spoil / Careening Bay	8/01/2020	SW317	0089_SW317_200108	Direct_into_Bottle				21.2	13.02	50724	5555	8.11	-56.6	Clear	Low
Dredge Spoil / Careening Bay	30/03/2020	SW317	0089_SW317_200330	Direct_into_Bottle	0.1	0.1		22.5	7.26	51782	33267	8.16	29.1	Clear	Low
Dredge Spoil / Careening Bay	21/07/2020	SW317	0089_SW317_200721	Direct_into_Bottle	0.1	0.8		16.1	6.48	44741	35074	8.24	5.6	Clear	Low
Dredge Spoil / Careening Bay	21/09/2020	SW317	0089_SW317_200921	Direct_into_Bottle	0.3	0.5		17.2	5.8	55117	36466	6.17	23.4	Clear	Low
Dredge Spoil / Careening Bay	14/12/2020	SW317	0089_SW317_201214	Direct into Bottle	0.3	0.9		24.5	4.02	55238		8.11	-11.7	Clear	Low
Dredge Spoil / Careening Bay	15/03/2021	SW317	0089_SW317_210315	Direct into Bottle	0.1	0.2		23.7	5.08	57326	37310	8.31	35.3	clear	Low
Dredge Spoil / Careening Bay	8/01/2020	SW318	0089_SW318_200108	Direct_into_Bottle				25.7	4.58	50.43	3230	7.99	-21.9	Clear	Low
Dredge Spoil / Careening Bay	30/03/2020	SW318	0089_SW318_200330	Direct_into_Bottle	0.1	0.2	QC103 and 203	22.5	6.94	54328	35360	8.28	2.5	Clear	Low
Dredge Spoil / Careening Bay	21/07/2020	SW318	0089_SW318_200721	Direct_into_Bottle	0.1	1.0		16	5.48	44825	35204	8.24	1.6	Clear	Low
Dredge Spoil / Careening Bay	21/09/2020	SW318	0089_SW318_200921	Direct_into_Bottle	0.1	0.2		17.2	5.49	55457	36049	8.11	39.2	Clear	Low
Dredge Spoil / Careening Bay	14/12/2020	SW318	0089_SW318201214	Direct into Bottle	0.2	0.9		22.7	4.86	54887		8.14	23.8	Clear	Low
Dredge Spoil / Careening Bay	15/03/2021	SW318	0089_SW318_210315	Direct into Bottle	0.1			24.1	3.44	57313	37310	8.31	34.9	clear	Low
Dredge Spoil / Careening Bay	30/03/2020	SW319	0089_SW319_200330	Direct_into_Bottle	0.1	0.3	Qc104 and 204	22.4	7.07	54127	35100	8.3	-4.2		Low
Dredge Spoil / Careening Bay	21/07/2020	SW319	0089_SW319_200721	Direct_into_Bottle	0.1	1.0		16	7.28	44403	34794.5	8.27	7.6	Clear	Low
Dredge Spoil / Careening Bay	21/09/2020	SW319	0089_SW319_200921	Direct_into_Bottle	0.1	0.2	Qc104/204	17	5.18	56641	36822.5	8.13	47.9	Clear	Low
Dredge Spoil / Careening Bay	14/12/2020	SW319	0089_SW319_201214	Direct into Bottle	0.1	0.4	Qc111/211	20.8	3.93	55164		8.15	53.4	Clear	Low
Dredge Spoil / Careening Bay	15/03/2021	SW319	0089_SW319_210315	Direct into Bottle	0.1	0.2	qc107,QC207	24.2	4.17	57377	37310	8.3	30.9	clear	Low
Waste Water Treatment Plant West	30/01/2020	SW353	0089_SW353_200130	Direct_into_Bottle										Clear	Low
Waste Water Treatment Plant West	21/07/2020	SW353	0089_SW353_200721	Direct_into_Bottle	0	1.0		17.6	7.36	18659	14137.5		25.1	Clear	High
Waste Water Treatment Plant West	23/09/2020	SW353	0089_SW353_200923	Direct_into_Bottle	0.1	0.5		21.1	5.05	56252	56595	8.22	87.9	Clear	Low
Waste Water Treatment Plant West	16/12/2020	SW353	0089_SW353_201216	Direct into Bottle	0.1	0.3		22.2	4.58	55317	35919	7.48	74.4	Clear	Low
Waste Water Treatment Plant West	17/03/2021	SW353	0089_SW353_210317	Direct into Bottle	0.1	0.2		25.9	4.36	55200		8.04	74.4	clear	Low
Waste Water Treatment Plant West	9/01/2020	SW370	0089_SW370_200109	Direct_into_Bottle	0.1	0.3									
Waste Water Treatment Plant West	31/03/2020	SW370	0089_SW370_200331	Direct_into_Bottle	0.2	0.3		22.3	2.62	55703	36205	7.97	-7.7	Clear	Low
Waste Water Treatment Plant West	15/07/2020	SW370	0089_SW370_200715	Direct_into_Bottle	0.2	0.8	Lots of seaweed	15.3	6.87	44144	35230	7.99	-41	Cloudy	Medium
Waste Water Treatment Plant West	24/09/2020	SW370	0089_SW370_200924	Direct_into_Bottle	0.9	1		19.6	4.42	54681	35542.5	7.96	-122.4	Clear	Medium
Waste Water Treatment Plant West	15/12/2020	SW370	0089_SW370_201215	Direct into Bottle	0.2	0.7		27.1	4.17	55292		7.91	-194.4	Clear	Low
Waste Water Treatment Plant West	16/03/2021	SW370	0089_SW370_210316	Direct into Bottle	0.1	0.9		25.2	3.67	54256	35395	7.79	46.3	Clear	Low
Waste Water Treatment Plant West	8/01/2020	SW371	0089_SW371_200108	Direct_into_Bottle				29	13.47	53812	6140	8.22	36.7	Clear	Low
Waste Water Treatment Plant West	20/07/2020	SW371	0089_SW371_200720	Direct_into_Bottle	0	1.2		16.9	12.45	18501	14222		18.6	Clear	Low
Waste Water Treatment Plant West	22/09/2020	SW371	0089_SW371_200922	Direct_into_Bottle	0.1	0.15		20.4	5	54165	35249	8.17	-136.7	Clear	Low
Waste Water Treatment Plant West	15/12/2020	SW371	0089_SW371_201215	Direct into Bottle	0.2	0.6		27.7	3.69	53972		8.34	-126.3	Clear	Medium
Waste Water Treatment Plant West	15/03/2021	SW371	0089_SW371_210315	Direct into Bottle	0.1	0.2	QC103/203	22.4	5.72	57225	37180	7.95	43.6	clear	Low
Waste Water Treatment Plant West	8/01/2020	SW372	0089_SW372_200108	Direct_into_Bottle				25.1	5.89	55087	5685	8.2	48.1	Clear	Low
Waste Water Treatment Plant West	31/03/2020	SW372	0089_SW372_200331	Direct_into_Bottle	0.2	0.3		24	4.31	66960	36400	8.16	6.3	Clear	Low
Waste Water Treatment Plant West	20/07/2020	SW372	0089_SW372_200720	Direct_into_Bottle	0	1.2		17	6.78	18735	14352		15.6	Clear	Low
Waste Water Treatment Plant West	22/09/2020	SW372	0089_SW372_200922	Direct_into_Bottle	0.1	0.2		20.7	5.62	53960	35054	8.19	-124.9	Clear	Low
Waste Water Treatment Plant West	15/12/2020	SW372	0089_SW372_201215	Direct into Bottle	0.1	0.3		23.7	4.87	55961	36400	8.24	12.8	Clear	Low
Waste Water Treatment Plant West	17/03/2021	SW372	0089_SW372_210317	Direct into Bottle	0.15	0.5		29	3.4	56038	36400	8.09	19.2	Clear	Low
Waste Water Treatment Plant West	8/01/2020	SW373	0089_SW373_200108	Direct_into_Bottle				25.1	8.28	1193	767	8.26	57.1	Clear	Low
Waste Water Treatment Plant West	31/03/2020	SW373	0089_SW373_200331	Direct_into_Bottle	0.1	0.2		23.8	5.56	56004	36400	8.19	-0.04		Low
Waste Water Treatment Plant West	20/07/2020	SW373	0089_SW373_200720	Direct_into_Bottle	0	1.2		17.3	6.69	18791	14319.5		14.5	Clear	Low
Waste Water Treatment Plant West	22/09/2020	SW373	0089_SW373_200922	Direct_into_Bottle	0.2	0.3		20.9	8.58	54251	53230	8.14	-135.2	Clear	Low
Waste Water Treatment Plant West	15/12/2020	SW373	0089_SW373_201215	Direct into Bottle	0.1	0.3		24.1	5.75	54728	35555	8.05	-18.5	Clear	Low
Waste Water Treatment Plant West	17/03/2021	SW373	0089_SW373_210317	Direct into Bottle	0.1			28.6	5.35	56199	36465	7.96	49.2	Clear	
Waste Water Treatment Plant West	30/01/2020	SW382	0089_SW382_200130	Direct_into_Bottle										Clear	Low
Waste Water Treatment Plant West	21/07/2020	SW382	0089_SW382_200721	Direct_into_Bottle	0	1.0		17.3	5.86	18592	14183		12	Clear	Medium
Waste Water Treatment Plant West	23/09/2020	SW382	0089_SW382_200923	Direct_into_Bottle	0.1	0.6		19.3	6.18	56644	36790	8.32	70.4	Clear	Medium
Waste Water Treatment Plant West	16/12/2020	SW382	0089_SW382_201216	Direct into Bottle	0.1	0.3	labelled PW382 in CoC	21.6	4.61	55161	35514	8.14	80.1	Clear	Low
Waste Water Treatment Plant West	17/03/2021	SW382	0089_SW382_210317	Direct into Bottle	0.1	0.2		24.4	4.82	55591	36140	8.14	71	clear	Low
Waste Water Treatment Plant West	30/01/2020	SW383	0089_SW383_200130	Direct_into_Bottle										Clear	Low
Waste Water Treatment Plant West	21/07/2020	SW383	0089_SW383_200721	Direct_into_Bottle	0	1.0		17.2	10	18647	14254.5		13	Clear	Medium
Waste Water Treatment Plant West	23/09/2020	SW383	0089_SW383_200923	Direct_into_Bottle	0.1	0.6		19.2	6.29	56099	56465	8.31	78.7	Clear	Low
Waste Water Treatment Plant West	16/12/2020	SW383	0089_SW383_201216	Direct into Bottle	0.1	0.4		21.9	4.71	55319	35742	8.15	76.1	Clear	Low
Waste Water Treatment Plant West	17/03/2021	SW383	0089_SW383_210317	Direct into Bottle	0.1	0.2		24.5	4.39	56098	36465	8.11	71.3	clear	Low
Waste Water Treatment Plant West	30/01/2020	SW384	0089_SW384_200130	Direct_into_Bottle										Clear	Low
Waste Water Treatment Plant West	21/07/2020	SW384	0089_SW384_200721	Direct_into_Bottle	0	1.0		17.3	7.67	18618	14170		8.9	Clear	Medium
Waste Water Treatment Plant West	16/12/2020	SW384	0089_SW384_201216	Direct into Bottle	0.1	0.4		22.5	4.23	55381	35010	8.13	70.5	Clear	Low
Waste Water Treatment Plant West	17/03/2021	SW384	0089_SW384_210317	Direct into Bottle	0.1	0.2		24.7	4.95	55855	36355	8.08	71.1	clear	Low
Helicopter Support Facility	14/01/2020	SW406	0089_SW406_200114	Direct_into_Bottle				26.8	7.13	31500	29753	8.05	-75.2	Clear	Low

Helicopter Support Facility	1/04/2020	SW406	0089_SW406_200401	Direct_into_Bottle	0.1	0.5		27.7	3.79	58512	36075	8.02	49.4		Low
Helicopter Support Facility	22/07/2020	SW406	0089_SW406_200722	Direct_into_Bottle	0	1.0	QC113, QC213	15.6	5.27	18223	14430		20	Clear	Medium
Helicopter Support Facility	21/09/2020	SW406	0089_SW406_200921	Direct_into_Bottle	0.1	0.2	Qc111/211	20.2	4.24	56799	36920	8.09	-113.3	Clear	Low
Helicopter Support Facility	15/12/2020	SW406	0089_SW406_201215	Direct into Bottle	0.1	0.2	labelled SW446 in CoC	22	4.84	54808		7.9	-65.4	Clear	Low
Helicopter Support Facility	15/03/2021	SW406	0089_SW406_210315	Direct into Bottle	0.1	0.9		25.2	10.48	56705	36855	8.26	34	Clear	Low
Helicopter Support Facility	14/01/2020	SW408	0089_SW408_200114	Direct_into_Bottle				26.5	6.5	28477	17972.5	8.01	-63.7	Clear	Low
Helicopter Support Facility	1/04/2020	SW408	0089_SW408_200401	Direct_into_Bottle	0.1	0.5		24	4.93	54299	36010	8.01	-20.5		Low
Helicopter Support Facility	22/07/2020	SW408	0089_SW408_200722	Direct_into_Bottle	0	1.0		15.8	5.75	18263	14397.5		18.4	Clear	Medium
Helicopter Support Facility	21/09/2020	SW408	0089_SW408_200921	Direct_into_Bottle	0.1	0.4		20.4	5.03	56275	36595	8.1	-104.8	Clear	Low
Helicopter Support Facility	15/12/2020	SW408	0089_SW408_201215	Direct into Bottle	0.2	0.5		19.8	4.85	53676		7.97	77	Clear	Low
Helicopter Support Facility	15/03/2021	SW408	0089_SW408_210315	Direct into Bottle	0.2	0.9		25.2	4.32	55957	36075	8.09	87.1		Low
Helicopter Support Facility	14/01/2020	SW410	0089_SW410_200114	Direct_into_Bottle				28.7	6.08	32170	9545	8.17	-98.5	Clear	Low
Helicopter Support Facility	2/04/2020	SW410	0089_SW410_200402	Direct_into_Bottle	0.1			23.6	5.63	53657	30305	7.77	-255.1	Clear	Low
Helicopter Support Facility	21/07/2020	SW410	0089_SW410_200721	Direct_into_Bottle	0.1	0.2		12.8	7.81	22026	186848	8.14	29.9	Clear	Medium
Helicopter Support Facility	22/09/2020	SW410	0089_SW410_200922	Direct_into_Bottle	0.1	0.2		19.5	4.06	56669	36402	8.21	-167.4	Clear	Low
Helicopter Support Facility	15/12/2020	SW410	0089_SW410_201215	Direct into Bottle	0.2	0.3		20.4	4.3	55888	36335	8	38.3	Clear	Low
Helicopter Support Facility	17/03/2021	SW410	0089_SW410_210317	Direct into Bottle	0.1	1		26.9	4.86	56457	36725	8.2	0.8	Clear	Low
Helicopter Support Facility	14/01/2020	SW412	0089_SW412_200114	Direct_into_Bottle				26.5	6.52	58803	37180	8.19	-68.4	Clear	Low
Helicopter Support Facility	1/04/2020	SW412	0089_SW412_200401	Direct_into_Bottle	0.1			23.7	6.2	53555	30195	7.66	-279.1	Clear	Low
Helicopter Support Facility	21/07/2020	SW412	0089_SW412_200721	Direct_into_Bottle	0.1	1.0		14.6	6.45	43445	35191	8.14	34	Clear	Low
Helicopter Support Facility	22/09/2020	SW412	0089_SW412_200922	Direct_into_Bottle	0.2	0.4		18.6	4.1	56982	37050	8.07	-181.7	Clear	Medium
Helicopter Support Facility	15/12/2020	SW412	0089_SW412_201215	Direct into Bottle	0.3	0.5		24.4	4.33	55088	35815	8.09	39.9	Clear	Low
Helicopter Support Facility	18/03/2021	SW412	0089_SW412_210318	Direct into Bottle	0.1	1		24	4.02	55929	36335	8.09	42.6	Clear	Low
Helicopter Support Facility	14/01/2020	SW414	0089_SW414_200114	Direct_into_Bottle				27.2	7.16	30498	39058	8.08	-65.2	Clear	Low
Helicopter Support Facility	2/04/2020	SW414	0089_SW414_200402	Direct_into_Bottle	0.1	0.5		23.3	21.22	56542	36790	8.1	131.6		
Helicopter Support Facility	21/07/2020	SW414	0089_SW414_200721	Direct_into_Bottle	0.1	1.0		15.5	6.03	44857	35550	8.09	42.3	Clear	Low
Helicopter Support Facility	22/09/2020	SW414	0089_SW414_200922	Direct_into_Bottle	0.1	0.2		19.3	4.7	56965	36985	8.16	-128.2	Clear	Low
Helicopter Support Facility	15/12/2020	SW414	0089_SW414_201215	Direct into Bottle	0.2	0.4		24.9	3.77	56119	36465	8.1	23.8	Clear	Low
Helicopter Support Facility	18/03/2021	SW414	0089_SW414_210318	Direct into Bottle	0.1	0.2		25	3.6	57455	37375	8.11	57.8	clear	Low
Helicopter Support Facility	14/01/2020	SW416	0089_SW416_200114	Direct_into_Bottle				28.1	6.18	50238	29276	8.17	-74.3	Clear	Low
Helicopter Support Facility	2/04/2020	SW416	0089_SW416_200402	Direct_into_Bottle	0.1	0.6		23	5.86	53672	36270	8.12	139.4		Low
Helicopter Support Facility	21/07/2020	SW416	0089_SW416_200721	Direct_into_Bottle	0.1	1.0		15.7	5.94	44851	35399	8.15	43.1	Clear	Medium
Helicopter Support Facility	22/09/2020	SW416	0089_SW416_200922	Direct_into_Bottle	0.1	0.2		21.6	4.57	56988	37050	8.17	-116.5	Clear	Low
Helicopter Support Facility	15/12/2020	SW416	0089_SW416_201215	Direct into Bottle	0.1	0.3		24.9	4.14	56798	36920	8.14	19.9	Clear	Low
Helicopter Support Facility	18/03/2021	SW416	0089_SW416_210318	Direct into Bottle	0.1	0.2		26.2	3.08	57773	37570	8.06	67.8	clear	Low
Stirling/Fire Training Area	8/06/2021	SW134	0089_SW134_210608	Direct_into_Bottle	0.1	1	QC110/210	15.6	4.9	54570	35470	8.27	-16	Cloudy	Low
Stirling/Fire Training Area	8/06/2021	SW132	0089_SW132_210608	Direct_into_Bottle	0.1	0.8		15.6	5.37	54346	35327.5	8.29	-40.1	Cloudy	Low
Stirling/Demolition Ground	8/06/2021	SW156	0089_SW156_210608	Direct_into_Bottle	0.1	0.2		16.5	4.02	53625	34858	8.18	127.1	clear	Low
Stirling/Demolition Ground	8/06/2021	SW154	0089_SW154_210608	Direct_into_Bottle	0.1	0.2		16.8	5.32	54609	35494	8.22	133	clear	Low
Stirling/Demolition Ground	8/06/2021	SW152	0089_SW152_210608	Direct_into_Bottle	0.1	0.2		17.7	4.45	54754	35591	8.23	128.5	clear	Low
Stirling/Demolition Ground	8/06/2021	SW150	0089_SW150_210608	Direct_into_Bottle	0.1	0.2	QC109/209	17	3.4	54785	35611	8.24	105.2	clear	Low
Stirling/Fire Training Area	8/06/2021	SW130	0089_SW130_210608	Direct_into_Bottle	0.1	0.2		16	1.1	54693	35550	7.83	-185.4	clear	Low
Stirling/Waste Water Treatment Plant West	8/06/2021	SW353	0089_SW353_210608	Direct_into_Bottle	0.1	0.2		19	4.34	54564	35466	8.17	13.7	clear	Low
Stirling/Waste Water Treatment Plant West	8/06/2021	SW384	0089_SW384_210608	Direct_into_Bottle	0.1	0.2		18.7	4.57	54325	35311	8.16	38.1	clear	Low
Stirling/Waste Water Treatment Plant West	8/06/2021	SW383	0089_SW383_210608	Direct_into_Bottle	0.1	0.2		18.5	4.59	54526	35442	8.19	44.3	clear	Low
Stirling/Waste Water Treatment Plant West	8/06/2021	SW382	0089_SW382_210608	Direct_into_Bottle	0.1	0.2		18.3	4.54	54459	35399	8.18	47.9	clear	Low
Stirling/Waste Water Treatment Plant East	9/06/2021	SW370	0089_SW370_210609	Direct_into_Bottle	0.1	0.5	Lots of seaweed	15.6	6.23	54368	35340	8.09	86	Brown (seaweed)	Medium
Stirling/Helicopter Support Facility	9/06/2021	SW310	0089_SW310_210609	Direct_into_Bottle	0.1	1		16.5	5.52	54493	35419	8.16	43.3	Clear	Low
Stirling/Helicopter Support Facility	9/06/2021	SW412	0089_SW412_210609	Direct_into_Bottle	0.1	1		16	6.08	52978	34456.5	7.92	94.4	Clear	Low
Stirling/Helicopter Support Facility	9/06/2021	SW414	0089_SW414_210609	Direct_into_Bottle	0.1	0.9		16	5.3	53140	34547.5	8.04	88.6	Clear	Low
Stirling/Helicopter Support Facility	9/06/2021	SW416	0089_SW416_210609	Direct_into_Bottle	0.1	1		16	4.92	53191	34573.5	8.09	85.3	Clear	Low
Stirling/Helicopter Support Facility	9/06/2021	SW311	0089_SW311_210609	Direct_into_Bottle	0.1	0.3		16.5	5.13	54469	35409	8.15	26.8	clear	Low
Stirling/Helicopter Support Facility	9/06/2021	SW309	0089_SW309_210609	Direct_into_Bottle	0.1	1		16.1	4.36	54535	35449	8.15	8.2	clear	Low
Stirling/Helicopter Support Facility	10/06/2021	SW410	0089_SW410_210610	Direct_into_Bottle	0.1	1	QC114/214	18	4.62	52927	34400	8.12	-10	Clear	Medium
Stirling/Helicopter Support Facility	10/06/2021	SW406	0089_SW406_210610	Direct_into_Bottle	0.1	1		19.1	3.75	53643	34868	8.09	2.2	Clear	Low
Stirling/Waste Water Treatment Plant East	10/06/2021	SW372	0089_SW372_210610	Direct_into_Bottle	0.3	1		19.2	3.09	53039	34482	8.68	44.7	Clear	Medium
Stirling/Waste Water Treatment Plant East	10/06/2021	SW305	0089_SW305_210610	Direct_into_Bottle	0.3	1		20.5	4.29	53296	34645	8.24	83.2	Ckear	Medium
Stirling/Waste Water Treatment Plant East	10/06/2021	SW371	0089_SW371_210610	Direct_into_Bottle	0.1	1		20.4	3.64	53197	34577	7.95	50.6	Brown	Medium
Stirling/Dredge Spoil / Careening Bay	10/06/2021	SW317	0089_SW317_210610	Direct_into_Bottle	0.3	1		18.1	6.24	53402	34716.5	8.92	37.9	Clear	Medium
Stirling/Dredge Spoil / Careening Bay	10/06/2021	SW318	0089_SW318_210610	Direct_into_Bottle	0.3	0.5		18	5.89	53555	34807.5	8.62	60.4	Clear	Medium
Stirling/Helicopter Support Facility	10/06/2021	SW408	0089_SW408_210610	Direct_into_Bottle	0.1	1		19.2	4.93	54169	35212	8.1	15.5	Clear	Low
Stirling/Waste Water Treatment Plant East	10/06/2021	SW373	0089_SW373_210610	Direct_into_Bottle	0.1	1		20.1	1.8	54076	35153	7.72	26.8	Clear	Medium
Stirling/Dredge Spoil / Careening Bay	10/06/2021	SW319	0089_SW319_210610	Direct_into_Bottle	0.2	1		17.7	5.27	53503	34781.5	8.56	64.5	Clear	Low
Stirling/Fire Training Area	30/08/2021	SW134	0089_SW134_210608	Direct_into_Bottle	0.1	0.6		16.4	5.59	53101	34515	7.97	-123.8	Clear	Low
Stirling/Fire Training Area	30/08/2021	SW132	0089_SW132_210608	Direct_into_Bottle	0.1	0.6		16.2	5.38	53095	34515	7.99	-132.1	Clear	Low
Stirling/Demolition Ground	30/08/2021	SW156	0089_SW156_210608	Direct_into_Bottle	0.15	0.5	QC104/204	16.7	4.34	52888	34378	7.88	-147.8	Clear	Low
Stirling/Demolition Ground	30/08/2021	SW154	0089_SW154_210608	Direct_into_Bottle	0.1	1	QC108/208	17	5.08	51820	33702	7.93	13.2	Clear	Low
Stirling/Demolition Ground	30/08/2021	SW152	0089_SW152_210608	Direct_into_Bottle	0.1	1		16.8	5.13	51556	33507	7.93	24.8	Clear	Low
Stirling/Demolition Ground	30/08/2021	SW150	0089_SW150_210608	Direct_into_Bottle	0.1	1		17.1	6.47	51910	33748	7.95	30.9	Clear	Low
Stirling/Fire Training Area	30/08/2021	SW130	0089_SW130_210608	Direct_into_Bottle	0.1	1		17.1	6.13	52057	3.839	8.01	24.2	Clear	Low
Stirling/Waste Water Treatment Plant West	1/09/2021	SW353	0089_SW353_210608	Direct_into_Bottle	0.15	0.5		17	5.17	52253	33969	7.94	-144.2	Clear	Low

Stirling/Waste Water Treatment Plant West	31/08/2021	SW384	0089_SW384_210608	Direct_into_Bottle	0.1	0.6	QC114, QC214	18.5	5.15	52731	34274.5	7.93	-131.1	Clear	Low
Stirling/Waste Water Treatment Plant West	31/08/2021	SW383	0089_SW383_210608	Direct_into_Bottle	0.1	0.6		18.6	5.78	53300	34645.5	8.09	-149.8	Clear	Low
Stirling/Waste Water Treatment Plant West	31/08/2021	SW382	0089_SW382_210608	Direct_into_Bottle	0.1	1		22.6	7.76	52532	34287	8.07	73.4	Clear	Low
Stirling/Waste Water Treatment Plant East	31/08/2021	SW370	0089_SW370_210609	Direct_into_Bottle	0.3	0.3		18.2	5.21	50586	2883.5	8.2	70.1	Clear	Low
Stirling/Helicopter Support Facility	31/08/2021	SW310	0089_SW310_210609	Direct_into_Bottle	0.3	0.3		17.6	5.13	51173	3267	8.17	65.9	Clear	Low
Stirling/Helicopter Support Facility	31/08/2021	SW412	0089_SW412_210609	Direct_into_Bottle	0.3	0.3		17.9	4.95	51342	3371	8.12	67.8	Clear	Low
Stirling/Helicopter Support Facility	30/08/2021	SW414	0089_SW414_210609	Direct_into_Bottle	0.1	1		17.5	6.62	52460	34099	8	81.6	Clear	Low
Stirling/Helicopter Support Facility	1/09/2021	SW416	0089_SW416_210609	Direct_into_Bottle	0.1	0.6		16.4	6.15	51948	33767.5	7.67	-148.5	Brown/clear	Low
Stirling/Helicopter Support Facility	1/09/2021	SW311	0089_SW311_210609	Direct_into_Bottle	0.1	0.5		16.9	5.24	51199	33280	7.76	-139.3	Clear	Low
Stirling/Helicopter Support Facility	1/09/2021	SW309	0089_SW309_210609	Direct_into_Bottle	0.1	0.6		17.3	6.09	52046	33826	7.96	-152.4	Clear	Low
Stirling/Helicopter Support Facility	30/08/2021	SW410	0089_SW410_210610	Direct_into_Bottle	0.1	1		17.2	4.93	48992	31856	7.5	166.1	Clear	Low
Stirling/Helicopter Support Facility	30/08/2021	SW406	0089_SW406_210610	Direct_into_Bottle	0.1	1		18.2	5.2	52620	34203	8.13	63.8	Clear	Low
Stirling/Waste Water Treatment Plant East	30/08/2021	SW372	0089_SW372_210610	Direct_into_Bottle	0.1	1		17.6	5.93	52224	33943	8.13	61.8	Clear	Low
Stirling/Waste Water Treatment Plant East	30/08/2021	SW305	0089_SW305_210610	Direct_into_Bottle	0.1	1		17.1	6.21	52220	33943	8.08	82.2	Clear	Low
Stirling/Waste Water Treatment Plant East	31/08/2021	SW371	0089_SW371_210610	Direct_into_Bottle	0.15	0.4		21.6	4.74	52058	33845	8.03	-119.2	Clear	Low
Stirling/Dredge Spoil / Careening Bay	31/08/2021	SW317	0089_SW317_210610	Direct_into_Bottle	0.1	1		22.1	5.87	50239	32740	7.72	6.3	Clear	Low
Stirling/Dredge Spoil / Careening Bay	31/08/2021	SW318	0089_SW318_210610	Direct_into_Bottle	0.1	1		21.2	6.06	51621	33553	7.91	-88.1	Clear	Low
Stirling/Helicopter Support Facility	1/09/2021	SW408	0089_SW408_210610	Direct_into_Bottle	0.1	1		16.5	7.19	27903	32109	8.09	97.5	Clear	Low
Stirling/Waste Water Treatment Plant East	1/09/2021	SW373	0089_SW373_210610	Direct_into_Bottle	0.1	1		16.8	6.65	52110	33871	8.04	90.4	Clear	Low
Stirling/Dredge Spoil / Careening Bay	1/09/2021	SW319	0089_SW319_210610	Direct_into_Bottle	0.1	1		17.1	6.6	52410	34066	7.97	83.5	Clear	Low

Monitoring Area	Date	Location Code	Sample ID	Sampling Method	Sample Depth (m)	Observations/QC
Accommodation Area	15/07/2020	SD346	0089_SD346_200715	Direct_into_Bottle	0.5	
Accommodation Area	22/09/2020	SD346	0089_SD346_200922	Direct_into_Bottle	0.1	
Accommodation Area	15/12/2020	SD346	0089_SD346_201215	Shovel Trowel	0.3	
Accommodation Area	17/03/2021	SD346	0089_SD346_210317	Shovel/Trowel	0.3	sample labeled SD366 in CoC
Demolition Ground	9/01/2020	SD329	0089_SD329_200109	Direct_into_Bottle	0.5	
Demolition Ground	10/01/2020	SD329	0089_SD329_200110	Direct_into_Bottle		
Demolition Ground	30/03/2020	SD329	0089_SD329_200330	Shovel_Trowel	0.5	
Demolition Ground	20/07/2020	SD329	0089_SD329_200720	Direct_into_Bottle	0.5	
Demolition Ground	23/09/2020	SD329	0089_SD329_200923	Direct_into_Bottle	0.4	
Demolition Ground	14/12/2020	SD329	0089_SD329_201214	Direct into Bottle	0.4	Qc101/qc201
Demolition Ground	16/03/2021	SD329	0089_SD329_210316	Shovel/Trowel	0.3	
Demolition Ground	8/06/2021	SD329	0089_SD329_210608	Direct_into_Bottle,Shov	0.2	QC104/204
Demolition Ground	30/08/2021	SD329	0089_SD329_210608	Direct_into_Bottle,Shov	0.5	
Demolition Ground	9/01/2020	SD330	0089_SD330_200109	Direct_into_Bottle	0.7	
Demolition Ground	10/01/2020	SD330	0089_SD330_200110	Direct_into_Bottle		
Demolition Ground	30/03/2020	SD330	0089_SD330_200330	Shovel_Trowel	0.5	
Demolition Ground	20/07/2020	SD330	0089_SD330_200720	Direct_into_Bottle	0.4	
Demolition Ground	22/09/2020	SD330	0089_SD330_200922	Shovel_Trowel	0.5	
Demolition Ground	8/06/2021	SD330	0089_SD330_210608	Direct_into_Bottle,Shov	0.2	
Demolition Ground	30/08/2021	SD330	0089_SD330_210608	Direct_into_Bottle,Shov	0.5	
Demolition Ground	9/01/2020	SD331	0089_SD331_200109	Direct_into_Bottle	0.6	labelled SD337 in ALS COA
Demolition Ground	10/01/2020	SD331	0089_SD331_200110	Direct_into_Bottle		
Demolition Ground	30/03/2020	SD331	0089_SD331_200330	Shovel_Trowel	0.4	
Demolition Ground	20/07/2020	SD331	0089_SD331_200720	Direct_into_Bottle	0.25	
Demolition Ground	23/09/2020	SD331	0089_SD331_200923	Shovel_Trowel	0.8	
Demolition Ground	23/09/2020	SD331	0089_SD331_200923	Shovel_Trowel	0.4	
Demolition Ground	14/12/2020	SD331	0089_SD331_201214	Direct into Bottle	0.5	Qc103/203
Demolition Ground	8/06/2021	SD331	0089_SD331_210608	Direct_into_Bottle,Shov	0.2	
Demolition Ground	30/08/2021	SD331	0089_SD331_210608	Direct_into_Bottle,Shov	0.5	
Demolition Ground	9/01/2020	SD356	0089_SD356_200109	Direct_into_Bottle	0.5	
Demolition Ground	10/01/2020	SD356	0089_SD356_200110	Direct_into_Bottle		
Demolition Ground	30/03/2020	SD356	0089_SD356_200330	Shovel_Trowel	0.5	
Demolition Ground	20/07/2020	SD356	0089_SD356_200720	Direct_into_Bottle	0.3	
Demolition Ground	23/09/2020	SD356	0089_SD356_200923	Shovel_Trowel	0.8	
Demolition Ground	14/12/2020	SD356	0089_SD356_201214	Direct into Bottle	0.5	
Demolition Ground	16/03/2021	SD356	0089_SD356_210316	Shovel/Trowel	0.5	
Demolition Ground	8/06/2021	SD356	0089_SD356_210608	Direct_into_Bottle,Shov	0.1	
Demolition Ground	30/08/2021	SD356	0089_SD356_210608	Direct_into_Bottle,Shov	0.5	QC109/209
Demolition Ground	10/01/2020	SD357	0089_SD357_200110	Direct_into_Bottle		
Demolition Ground	30/03/2020	SD357	0089_SD357_200330	Shovel_Trowel	0.5	
Demolition Ground	20/07/2020	SD357	0089_SD357_200720	Direct_into_Bottle	0.3	
Demolition Ground	23/09/2020	SD357	0089_SD357_200923	Shovel_Trowel	0.4	
Demolition Ground	14/12/2020	SD357	0089_SD357_201214	Direct into Bottle	0.5	
Demolition Ground	16/03/2021	SD357	0089_SD357_210316	Shovel/Trowel	0.3	
Demolition Ground	8/06/2021	SD357	0089_SD357_210608	Direct_into_Bottle,Shov	0.3	
Demolition Ground	30/08/2021	SD357	0089_SD357_210608	Direct_into_Bottle,Shov	0.5	
Demolition Ground	9/01/2020	SD358	0089_SD358_200109	Direct_into_Bottle	0.5	
Demolition Ground	10/01/2020	SD358	0089_SD358_200110	Direct_into_Bottle		
Demolition Ground	30/03/2020	SD358	0089_SD358_200330	Shovel_Trowel	0.5	
Demolition Ground	20/07/2020	SD358	0089_SD358_200720	Direct_into_Bottle	0.5	
Demolition Ground	23/09/2020	SD358	0089_SD358_200923	Direct_into_Bottle	0.5	
Demolition Ground	16/03/2021	SD358	0089_SD358_210316	Shovel/Trowel	0.2	
Demolition Ground	8/06/2021	SD358	0089_SD358_210608	Direct_into_Bottle,Shov	0.2	
Demolition Ground	30/08/2021	SD358	0089_SD358_210608	Direct_into_Bottle,Shov	0.5	
Dredge Spoil / Careening Bay	8/01/2020	SD374	0089_SD374_200108	Direct_into_Bottle	0.5	QC107/207
Dredge Spoil / Careening Bay	30/03/2020	SD374	0089_SD374_200330	Direct_into_Bottle	0.4	
Dredge Spoil / Careening Bay	21/07/2020	SD374	0089_SD374_200721	Shovel_Trowel	0.2	
Dredge Spoil / Careening Bay	21/09/2020	SD374	0089_SD374_200921	Direct_into_Bottle	0.3	QC102 /QC202
Dredge Spoil / Careening Bay	14/12/2020	SD374	0089_SD374_201214	Direct into Bottle	0.5	
Dredge Spoil / Careening Bay	15/03/2021	SD374	0089_SD374_210315	Shovel/Trowel	0.2	QC105, QC205
Dredge Spoil / Careening Bay	10/06/2021	SD374	0089_SD374_210610	Direct_into_Bottle,Shov	0.2	
Dredge Spoil / Careening Bay	1/09/2021	SD374	0089_SD374_210610	Direct_into_Bottle,Shov	0.6	
Dredge Spoil / Careening Bay	8/01/2020	SD375	0089_SD375_200108	Direct_into_Bottle	0.4	
Dredge Spoil / Careening Bay	30/03/2020	SD375	0089_SD375_200330	Shovel_Trowel,Hand_A	0.3	
Dredge Spoil / Careening Bay	21/07/2020	SD375	0089_SD375_200721	Shovel_Trowel	0.2	
Dredge Spoil / Careening Bay	21/09/2020	SD375	0089_SD375_200921	Direct_into_Bottle		
Dredge Spoil / Careening Bay	14/12/2020	SD375	0089_SD375_201214	Direct into Bottle	0.5	
Dredge Spoil / Careening Bay	15/03/2021	SD375	0089_SD375_210315	Shovel/Trowel	0.2	
Dredge Spoil / Careening Bay	10/06/2021	SD375	0089_SD375_210610	Direct_into_Bottle,Shov	0.2	
Dredge Spoil / Careening Bay	1/09/2021	SD375	0089_SD375_210610	Direct_into_Bottle,Shov	0.6	
Dredge Spoil / Careening Bay	8/01/2020	SD378	0089_SD378_200108	Direct_into_Bottle	0.3	
Dredge Spoil / Careening Bay	30/03/2020	SD378	0089_SD378_200330	Shovel_Trowel,Direct_i	0.3	
Dredge Spoil / Careening Bay	21/07/2020	SD378	0089_SD378_200721	Shovel_Trowel	0.2	
Dredge Spoil / Careening Bay	21/09/2020	SD378	0089_SD378_200921	Direct_into_Bottle		Qc105/qc205
Dredge Spoil / Careening Bay	14/12/2020	SD378	0089_SD378_201214	Direct into Bottle	0.4	
Dredge Spoil / Careening Bay	15/03/2021	SD378	0089_SD378_210315	Shovel/Trowel	0.2	
Dredge Spoil / Careening Bay	10/06/2021	SD378	0089_SD378_210610	Direct_into_Bottle,Shov	0.2	
Dredge Spoil / Careening Bay	1/09/2021	SD378	0089_SD378_210610	Direct_into_Bottle,Shov	0.5	
Fire Training Area	9/01/2020	SD335	0089_SD335_200109	Direct_into_Bottle	0.4	
Fire Training Area	30/03/2020	SD335	0089_SD335_200330	Shovel_Trowel	0.5	
Fire Training Area	15/07/2020	SD335	0089_SD335_200715	Direct_into_Bottle	1	QC101/201
Fire Training Area	22/09/2020	SD335	0089_SD335_200922	Shovel_Trowel	0.8	
Fire Training Area	14/12/2020	SD335	0089_SD335_201214	Direct into Bottle	0.4	
Fire Training Area	15/03/2021	SD335	0089_SD335_210315	Shovel/Trowel	0.4	
Fire Training Area	8/06/2021	SD335	0089_SD335_210608	Direct_into_Bottle,Shov	0.2	
Fire Training Area	30/08/2021	SD335	0089_SD335_210608	Direct_into_Bottle,Shov	0.4	
Fire Training Area	9/01/2020	SD340	0089_SD340_200109	Direct_into_Bottle	0.5	
Fire Training Area	30/03/2020	SD340	0089_SD340_200330	Shovel_Trowel	0.5	QC108 & QC208 taken here
Fire Training Area	15/07/2020	SD340	0089_SD340_200715	Direct_into_Bottle	0.8	
Fire Training Area	22/09/2020	SD340	0089_SD340_200922	Shovel_Trowel	0.6	
Fire Training Area	14/12/2020	SD340	0089_SD340_201214	Shovel Trowel	0.3	
Fire Training Area	15/03/2021	SD340	0089_SD340_210315	Shovel/Trowel	0.3	
Fire Training Area	8/06/2021	SD340	0089_SD340_210608	Direct_into_Bottle,Shov	0.1	
Fire Training Area	30/08/2021	SD340	0089_SD340_210608	Direct_into_Bottle,Shov	0.5	QC107/207

Fire Training Area	8/01/2020	SD341	0089_SD341_200108	Direct_into_Bottle	0.5	QC105/205
Fire Training Area	31/03/2020	SD341	0089_SD341_200331	Shovel_Trowel	0.5	
Fire Training Area	15/07/2020	SD341	0089_SD341_200715	Direct_into_Bottle	1	
Fire Training Area	22/09/2020	SD341	0089_SD341_200922	Shovel_Trowel	0.8	
Fire Training Area	14/12/2020	SD341	0089_SD341_201214	Shovel Trowel	0.2	
Fire Training Area	15/03/2021	SD341	0089_SD341_210315	Shovel/Trowel	0.3	
Fire Training Area	8/06/2021	SD341	0089_SD341_210608	Direct_into_Bottle,Shov	0.1	
Fire Training Area	30/08/2021	SD341	0089_SD341_210608	Direct_into_Bottle,Shov	0.5	
Fire Training Area	8/01/2020	SD362	0089_SD362_200108	Direct_into_Bottle	0.5	
Fire Training Area	31/03/2020	SD362	0089_SD362_200331	Shovel_Trowel	0.5	
Fire Training Area	15/07/2020	SD362	0089_SD362_200715	Direct_into_Bottle	0.8	QC02
Fire Training Area	22/09/2020	SD362	0089_SD362_200922	Shovel_Trowel	0.9	
Fire Training Area	14/12/2020	SD362	0089_SD362_201214	Shovel Trowel	0.3	
Fire Training Area	15/03/2021	SD362	0089_SD362_210315	Shovel/Trowel	0.5	
Fire Training Area	8/06/2021	SD362	0089_SD362_210608	Direct_into_Bottle,Shov	0.1	
Fire Training Area	30/08/2021	SD362	0089_SD362_210608	Direct_into_Bottle,Shov	0.5	
Fire Training Area	8/01/2020	SD363	0089_SD363_200108	Direct_into_Bottle	0.5	
Fire Training Area	31/03/2020	SD363	0089_SD363_200331	Shovel_Trowel	0.8	
Fire Training Area	15/07/2020	SD363	0089_SD363_200715	Direct_into_Bottle	0.8	
Fire Training Area	22/09/2020	SD363	0089_SD363_200922	Shovel_Trowel	0.6	
Fire Training Area	14/12/2020	SD363	0089_SD363_201214	Shovel Trowel	0.3	
Fire Training Area	15/03/2021	SD363	0089_SD363_210315	Shovel/Trowel	0.3	
Fire Training Area	8/06/2021	SD363	0089_SD363_210608	Direct_into_Bottle,Shov	0.1	
Fire Training Area	30/08/2021	SD363	0089_SD363_210608	Direct_into_Bottle,Shov	0.5	
Fire Training Area	9/01/2020	SD364	0089_SD364_200109	Direct_into_Bottle	0.5	
Fire Training Area	30/03/2020	SD364	0089_SD364_200330	Shovel_Trowel	0.5	QC106 & QC206 here
Fire Training Area	15/07/2020	SD364	0089_SD364_200715	Direct_into_Bottle	0.8	
Fire Training Area	22/09/2020	SD364	0089_SD364_200922	Shovel_Trowel	0.9	
Fire Training Area	14/12/2020	SD364	0089_SD364_201214	Direct into Bottle	0.4	
Fire Training Area	15/03/2021	SD364	0089_SD364_210315	Shovel/Trowel	0.4	
Fire Training Area	8/06/2021	SD364	0089_SD364_210608	Direct_into_Bottle,Shov	0.2	
Fire Training Area	30/08/2021	SD364	0089_SD364_210608	Direct_into_Bottle,Shov	0.4	
Fire Training Area	31/03/2020	SD367	0089_SD367_200331	Direct_into_Bottle,Shov	0.4	
Fire Training Area	15/07/2020	SD367	0089_SD367_200715	Direct_into_Bottle	0.5	
Fire Training Area	22/09/2020	SD367	0089_SD367_200922	Direct_into_Bottle	0.2	
Fire Training Area	15/12/2020	SD367	0089_SD367_201215	Direct into Bottle	0.5	
Fire Training Area	15/03/2021	SD367	0089_SD367_210315	Shovel/Trowel	0.3	
Helicopter Support Facility	21/01/2020	SD306	0089_SD306_200121	Direct_into_Bottle	0.2	
Helicopter Support Facility	31/03/2020	SD306	0089_SD306_200331	Shovel_Trowel	1.1	
Helicopter Support Facility	22/07/2020	SD306	0089_SD306_200722	Direct_into_Bottle	0.6	
Helicopter Support Facility	23/09/2020	SD306	0089_SD306_200923	Direct_into_Bottle	0.5	
Helicopter Support Facility	15/12/2020	SD306	0089_SD306_201215	Direct into Bottle	0.5	
Helicopter Support Facility	17/03/2021	SD306	0089_SD306_210317	Shovel/Trowel	0.2	
Helicopter Support Facility	9/06/2021	SD306	0089_SD306_210609	Direct_into_Bottle,Shov	0.3	
Helicopter Support Facility	31/08/2021	SD306	0089_SD306_210609	Direct_into_Bottle,Shov	0.5	QC115/215
Helicopter Support Facility	21/01/2020	SD307	0089_SD307_200121	Direct_into_Bottle	0.2	
Helicopter Support Facility	31/03/2020	SD307	0089_SD307_200331	Shovel_Trowel	1	
Helicopter Support Facility	22/07/2020	SD307	0089_SD307_200722	Direct_into_Bottle	0.3	
Helicopter Support Facility	23/09/2020	SD307	0089_SD307_200923	Shovel_Trowel	0.4	
Helicopter Support Facility	15/12/2020	SD307	0089_SD307_201215	Direct into Bottle	0.3	
Helicopter Support Facility	9/06/2021	SD307	0089_SD307_210609	Direct_into_Bottle,Shov	0.3	
Helicopter Support Facility	31/08/2021	SD307	0089_SD307_210609	Direct_into_Bottle,Shov	0.5	
Helicopter Support Facility	21/01/2020	SD308	0089_SD308_200121	Direct_into_Bottle	0.3	
Helicopter Support Facility	1/04/2020	SD308	0089_SD308_200401	Shovel_Trowel	1.2	
Helicopter Support Facility	22/07/2020	SD308	0089_SD308_200722	Direct_into_Bottle	0.5	
Helicopter Support Facility	23/09/2020	SD308	0089_SD308_200923	Direct_into_Bottle	0.4	
Helicopter Support Facility	15/12/2020	SD308	0089_SD308_201215	Direct into Bottle	0.5	
Helicopter Support Facility	17/03/2021	SD308	0089_SD308_210317	Shovel/Trowel	0.3	QC117, QC217
Helicopter Support Facility	9/06/2021	SD308	0089_SD308_210609	Direct_into_Bottle,Shov	0.2	
Helicopter Support Facility	31/08/2021	SD308	0089_SD308_210609	Direct_into_Bottle,Shov	0.5	
Helicopter Support Facility	21/01/2020	SD314	0089_SD314_200121	Direct_into_Bottle	3	
Helicopter Support Facility	31/03/2020	SD314	0089_SD314_200331	Shovel_Trowel	0.7	
Helicopter Support Facility	22/07/2020	SD314	0089_SD314_200722	Direct_into_Bottle	0.5	
Helicopter Support Facility	23/09/2020	SD314	0089_SD314_200923	Shovel_Trowel	0.5	
Helicopter Support Facility	15/12/2020	SD314	0089_SD314_201215	Direct into Bottle	0.5	
Helicopter Support Facility	17/03/2021	SD314	0089_SD314_210317	Shovel/Trowel	0.3	
Helicopter Support Facility	9/06/2021	SD314	0089_SD314_210609	Direct_into_Bottle,Shov	0.5	
Helicopter Support Facility	31/08/2021	SD314	0089_SD314_210609	Direct_into_Bottle,Shov	0.5	
Helicopter Support Facility	21/01/2020	SD315	0089_SD315_200121	Direct_into_Bottle	0.4	Taken 2m closer to shoreline
Helicopter Support Facility	1/04/2020	SD315	0089_SD315_200401	Shovel_Trowel	1.1	
Helicopter Support Facility	22/07/2020	SD315	0089_SD315_200722	Direct_into_Bottle	0.5	
Helicopter Support Facility	23/09/2020	SD315	0089_SD315_200923	Direct_into_Bottle	0.5	
Helicopter Support Facility	15/12/2020	SD315	0089_SD315_201215	Direct into Bottle	0.5	
Helicopter Support Facility	17/03/2021	SD315	0089_SD315_210317	Shovel/Trowel	0.2	
Helicopter Support Facility	9/06/2021	SD315	0089_SD315_210609	Direct_into_Bottle,Shov	0.8	
Helicopter Support Facility	31/08/2021	SD315	0089_SD315_210609	Direct_into_Bottle,Shov	0.5	
Helicopter Support Facility	21/01/2020	SD316	0089_SD316_200121	Direct_into_Bottle	0.3	Taken 2m closer to shoreline
Helicopter Support Facility	1/04/2020	SD316	0089_SD316_200401	Shovel_Trowel	1.2	
Helicopter Support Facility	22/07/2020	SD316	0089_SD316_200722	Direct_into_Bottle	0.3	
Helicopter Support Facility	23/09/2020	SD316	0089_SD316_200923	Direct_into_Bottle	0.5	
Helicopter Support Facility	15/12/2020	SD316	0089_SD316_201215	Direct into Bottle	0.4	
Helicopter Support Facility	9/06/2021	SD316	0089_SD316_210609	Direct_into_Bottle,Shov	0.3	
Helicopter Support Facility	31/08/2021	SD316	0089_SD316_210609	Direct_into_Bottle,Shov	1	
Helicopter Support Facility	1/04/2020	SD405	0089_SD405_200401	Shovel_Trowel	0.5	
Helicopter Support Facility	22/07/2020	SD405	0089_SD405_200722	Direct_into_Bottle	0.4	
Helicopter Support Facility	21/09/2020	SD405	0089_SD405_200921	Direct_into_Bottle		
Helicopter Support Facility	15/12/2020	SD405	0089_SD405_201215	Direct into Bottle	0.5	
Helicopter Support Facility	15/03/2021	SD405	0089_SD405_210315	Shovel/Trowel	0.2	
Helicopter Support Facility	10/06/2021	SD405	0089_SD405_210610	Direct_into_Bottle,Shov	0.6	Qc116/216
Helicopter Support Facility	31/08/2021	SD405	0089_SD405_210610	Direct_into_Bottle,Shov	0.3	
Helicopter Support Facility	1/04/2020	SD407	0089_SD407_200401	Shovel_Trowel	0.8	
Helicopter Support Facility	22/07/2020	SD407	0089_SD407_200722	Direct_into_Bottle	0.4	
Helicopter Support Facility	21/09/2020	SD407	0089_SD407_200921	Direct_into_Bottle	0.3	
Helicopter Support Facility	15/12/2020	SD407	0089_SD407_201215	Direct into Bottle	0.2	
Helicopter Support Facility	15/03/2021	SD407	0089_SD407_210315	Shovel/Trowel	0.2	

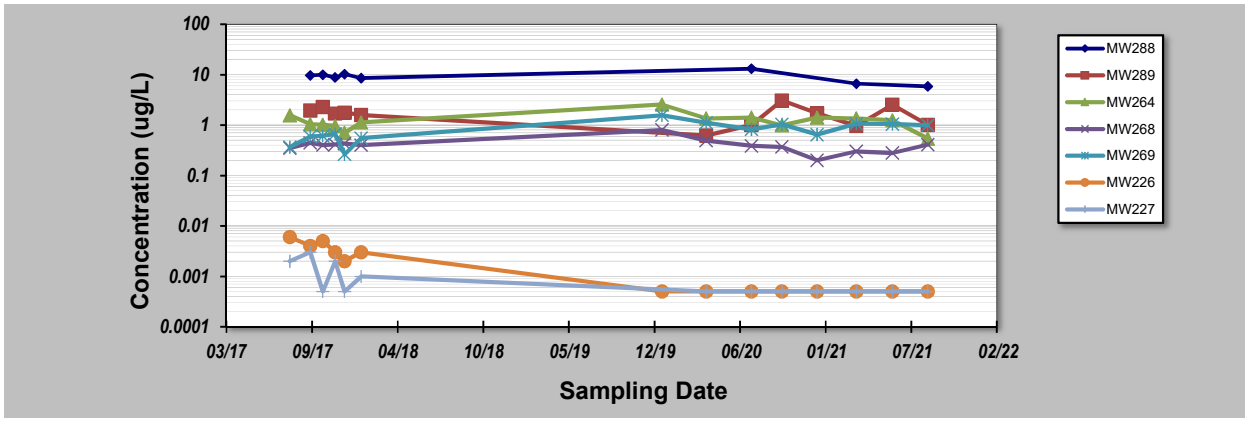
Helicopter Support Facility	10/06/2021	SD407	0089_SD407_210610	Direct_into_Bottle,Shov	0.2	
Helicopter Support Facility	31/08/2021	SD407	0089_SD407_210610	Direct_into_Bottle,Shov	0.5	
Helicopter Support Facility	1/04/2020	SD409	0089_SD409_200401	Shovel_Trowel	0.5	
Helicopter Support Facility	21/07/2020	SD409	0089_SD409_200721	Direct_into_Bottle	0.6	
Helicopter Support Facility	22/09/2020	SD409	0089_SD409_200922	Direct_into_Bottle	0.3	
Helicopter Support Facility	15/12/2020	SD409	0089_SD409_201215	Shovel Trowel	0.3	
Helicopter Support Facility	17/03/2021	SD409	0089_SD409_210317	Shovel/Trowel	0.3	
Helicopter Support Facility	10/06/2021	SD409	0089_SD409_210610	Direct_into_Bottle,Shov	0.2	
Helicopter Support Facility	31/08/2021	SD409	0089_SD409_210610	Direct_into_Bottle,Shov	0.3	
Helicopter Support Facility	1/04/2020	SD411	0089_SD411_200401	Shovel_Trowel	1	
Helicopter Support Facility	21/07/2020	SD411	0089_SD411_200721	Shovel_Trowel	0.6	
Helicopter Support Facility	22/09/2020	SD411	0089_SD411_200922	Direct_into_Bottle	0.5	
Helicopter Support Facility	15/12/2020	SD411	0089_SD411_201215	Shovel Trowel	0.3	
Helicopter Support Facility	18/03/2021	SD411	0089_SD411_210318	Shovel/Trowel	0.6	
Helicopter Support Facility	9/06/2021	SD411	0089_SD411_210609	Direct_into_Bottle,Shov	0.3	
Helicopter Support Facility	1/09/2021	SD411	0089_SD411_210609	Direct_into_Bottle,Shov	1.2	
Helicopter Support Facility	1/04/2020	SD413	0089_SD413_200401	Shovel_Trowel	0.7	
Helicopter Support Facility	21/07/2020	SD413	0089_SD413_200721	Shovel_Trowel	0.5	
Helicopter Support Facility	22/09/2020	SD413	0089_SD413_200922	Direct_into_Bottle	0.5	
Helicopter Support Facility	15/12/2020	SD413	0089_SD413_201215	Shovel Trowel	0.2	
Helicopter Support Facility	18/03/2021	SD413	0089_SD413_210318	Shovel/Trowel	0.2	
Helicopter Support Facility	9/06/2021	SD413	0089_SD413_210609	Direct_into_Bottle,Shov	0.3	
Helicopter Support Facility	1/09/2021	SD413	0089_SD413_210609	Direct_into_Bottle,Shov	0.5	
Helicopter Support Facility	1/04/2020	SD415	0089_SD415_200401	Shovel_Trowel	0.6	
Helicopter Support Facility	21/07/2020	SD415	0089_SD415_200721	Shovel_Trowel	0.8	
Helicopter Support Facility	22/09/2020	SD415	0089_SD415_200922	Direct_into_Bottle	0.3	
Helicopter Support Facility	15/12/2020	SD415	0089_SD415_201215	Shovel Trowel	0.3	
Helicopter Support Facility	18/03/2021	SD415	0089_SD415_210318	Shovel/Trowel	0.2	
Helicopter Support Facility	9/06/2021	SD415	0089_SD415_210609	Direct_into_Bottle,Shov	0.3	
Helicopter Support Facility	1/09/2021	SD415	0089_SD415_210609	Direct_into_Bottle,Shov	0.5	
Waste Water Treatment Plant East	8/01/2020	SD304	0089_SD304_200108	Direct_into_Bottle	0.4	
Waste Water Treatment Plant East	20/07/2020	SD304	0089_SD304_200720	Direct_into_Bottle	0.3	
Waste Water Treatment Plant East	22/09/2020	SD304	0089_SD304_200922	Direct_into_Bottle	0.2	
Waste Water Treatment Plant East	15/12/2020	SD304	0089_SD304_201215	Direct into Bottle	0.5	
Waste Water Treatment Plant East	15/03/2021	SD304	0089_SD304_210315	Shovel/Trowel	0.3	
Waste Water Treatment Plant East	10/06/2021	SD304	0089_SD304_210610	Direct_into_Bottle,Shov	0.3	
Waste Water Treatment Plant East	1/09/2021	SD304	0089_SD304_210610	Direct_into_Bottle,Shov	0.5	
Waste Water Treatment Plant East	9/01/2020	SD345	0089_SD345_200109	Direct_into_Bottle		
Waste Water Treatment Plant East	31/03/2020	SD345	0089_SD345_200331	Direct_into_Bottle	0.4	
Waste Water Treatment Plant East	15/07/2020	SD345				Not sampled. Covered by 1m of seaweed
Waste Water Treatment Plant East	24/09/2020	SD345	0089_SD345_200924	Direct_into_Bottle	0.45	
Waste Water Treatment Plant East	15/12/2020	SD345	0089_SD345_201215	Direct into Bottle	0.4	
Waste Water Treatment Plant East	16/03/2021	SD345	0089_SD345_210316	Shovel/Trowel	0.5	
Waste Water Treatment Plant East	9/06/2021	SD345	0089_SD345_210609	Direct_into_Bottle,Shov	0.1	
Waste Water Treatment Plant East	1/09/2021	SD345	0089_SD345_210609	Direct_into_Bottle,Shov	0.4	
Waste Water Treatment Plant East	10/06/2021	SD346	0089_SD346_210610	Direct_into_Bottle,Shov	0.3	
Waste Water Treatment Plant East	30/08/2021	SD346	0089_SD346_210610	Direct_into_Bottle,Shov	0.5	QC105/205
Waste Water Treatment Plant East	9/06/2021	SD367	0089_SD367_210609	Direct_into_Bottle,Shov	0.1	
Waste Water Treatment Plant East	1/09/2021	SD367	0089_SD367_210609	Direct_into_Bottle,Shov	0.4	
Waste Water Treatment Plant East	8/01/2020	SD368	0089_SD368_200108	Direct_into_Bottle	1	
Waste Water Treatment Plant East	20/07/2020	SD368	0089_SD368_200720	Direct_into_Bottle	0.3	
Waste Water Treatment Plant East	22/09/2020	SD368	0089_SD368_200922	Direct_into_Bottle	0.4	
Waste Water Treatment Plant East	15/12/2020	SD368	0089_SD368_201215	Direct into Bottle	0.4	
Waste Water Treatment Plant East	15/03/2021	SD368	0089_SD368_210315	Shovel/Trowel	0.3	QC101, QC201
Waste Water Treatment Plant East	10/06/2021	SD368	0089_SD368_210610	Direct_into_Bottle,Shov	0.2	
Waste Water Treatment Plant East	1/09/2021	SD368	0089_SD368_210610	Direct_into_Bottle,Shov	0.5	
Waste Water Treatment Plant East	9/01/2020	SD369	0089_SD369_200109	Direct_into_Bottle	0.4	
Waste Water Treatment Plant East	10/01/2020	SD369	0089_SD369_200110	Direct_into_Bottle		
Waste Water Treatment Plant East	31/03/2020	SD369	0089_SD369_200331	Shovel_Trowel,Direct_i	0.4	
Waste Water Treatment Plant East	15/07/2020	SD369	0089_SD369_200715	Direct_into_Bottle	1	
Waste Water Treatment Plant East	24/09/2020	SD369	0089_SD369_200924	Direct_into_Bottle	0.4	
Waste Water Treatment Plant East	15/12/2020	SD369	0089_SD369_201215	Direct into Bottle	0.4	
Waste Water Treatment Plant East	16/03/2021	SD369	0089_SD369_210316	Shovel/Trowel	0.3	
Waste Water Treatment Plant East	9/06/2021	SD369	0089_SD369_210609	Direct_into_Bottle,Shov	0.1	
Waste Water Treatment Plant East	1/09/2021	SD369	0089_SD369_210609	Direct_into_Bottle,Shov	0.5	
Waste Water Treatment Plant West	30/01/2020	SD350	0089_SD350_200130	Direct_into_Bottle	0.2	
Waste Water Treatment Plant West	21/07/2020	SD350	0089_SD350_200721	Direct_into_Bottle	0.6	
Waste Water Treatment Plant West	23/09/2020	SD350	0089_SD350_200923	Direct_into_Bottle	0.5	
Waste Water Treatment Plant West	16/12/2020	SD350	0089_SD350_201216	Shovel Trowel	0.3	
Waste Water Treatment Plant West	17/03/2021	SD350	0089_SD350_210317	Shovel/Trowel	0.4	
Waste Water Treatment Plant West	8/06/2021	SD350	0089_SD350_210608	Direct_into_Bottle,Shov	0.5	
Waste Water Treatment Plant West	30/08/2021	SD350	0089_SD350_210608	Direct_into_Bottle,Shov	0.5	
Waste Water Treatment Plant West	30/01/2020	SD351	0089_SD351_200130	Direct_into_Bottle		
Waste Water Treatment Plant West	21/07/2020	SD351	0089_SD351_200721	Direct_into_Bottle	0.55	
Waste Water Treatment Plant West	16/12/2020	SD351	0089_SD351_201216	Direct into Bottle	0.7	
Waste Water Treatment Plant West	17/03/2021	SD351	0089_SD351_210317	Shovel/Trowel	0.5	
Waste Water Treatment Plant West	8/06/2021	SD351	0089_SD351_210608	Direct_into_Bottle,Shov	0.5	
Waste Water Treatment Plant West	30/08/2021	SD351	0089_SD351_210608	Direct_into_Bottle,Shov	0.5	
Waste Water Treatment Plant West	30/01/2020	SD352	0089_SD352_200130	Direct_into_Bottle		
Waste Water Treatment Plant West	2/04/2020	SD352	0089_SD352_200402	Shovel_Trowel	0.8	
Waste Water Treatment Plant West	21/07/2020	SD352	0089_SD352_200721	Direct_into_Bottle	0.3	
Waste Water Treatment Plant West	16/12/2020	SD352	0089_SD352_201216	Direct into Bottle	0.5	
Waste Water Treatment Plant West	16/12/2020	SD352	0089_SD352_201216	Shovel Trowel	0.5	
Waste Water Treatment Plant West	17/03/2021	SD352	0089_SD352_210317	Shovel/Trowel	0.5	
Waste Water Treatment Plant West	8/06/2021	SD352	0089_SD352_210608	Direct_into_Bottle,Shov	0.5	
Waste Water Treatment Plant West	30/08/2021	SD352	0089_SD352_210608	Direct_into_Bottle,Shov	0.5	
Waste Water Treatment Plant West	30/01/2020	SD380	0089_SD380_200130	Direct_into_Bottle	0.3	
Waste Water Treatment Plant West	21/07/2020	SD380	0089_SD380_200721	Direct_into_Bottle	0.5	
Waste Water Treatment Plant West	23/09/2020	SD380	0089_SD380_200923	Direct_into_Bottle	0.45	
Waste Water Treatment Plant West	16/12/2020	SD380	0089_SD380_201216	Shovel Trowel	0.5	
Waste Water Treatment Plant West	17/03/2021	SD380	0089_SD380_210317	Shovel/Trowel	0.5	
Waste Water Treatment Plant West	17/03/2021	SD380	0089_SD380_210317	Shovel/Trowel	0.3	
Waste Water Treatment Plant West	8/06/2021	SD380	0089_SD380_210608	Direct_into_Bottle,Shov	0.1	
Waste Water Treatment Plant West	30/08/2021	SD380	0089_SD380_210608	Direct_into_Bottle,Shov	0.5	
Waste Water Treatment Plant West	30/01/2020	SD381	0089_SD381_200130	Direct_into_Bottle	0.3	

Waste Water Treatment Plant West	2/04/2020	SD381	0089_SD381_200402	Shovel_Trowel	1.2
Waste Water Treatment Plant West	21/07/2020	SD381	0089_SD381_200721	Direct_into_Bottle	0.4
Waste Water Treatment Plant West	16/12/2020	SD381	0089_SD381_201216	Shovel Trowel	0.5
Waste Water Treatment Plant West	16/12/2020	SD381	0089_SD381_201216	Shovel Trowel	0.6
Waste Water Treatment Plant West	17/03/2021	SD381	0089_SD381_210317	Shovel/Trowel	0.5
Waste Water Treatment Plant West	8/06/2021	SD381	0089_SD381_210608	Direct_into_Bottle,Shov	0.1
Waste Water Treatment Plant West	30/08/2021	SD381	0089_SD381_210608	Direct_into_Bottle,Shov	0.5
Waste Water Treatment Plant West	30/01/2020	SD401	0089_SD401_200130	Direct_into_Bottle	
Waste Water Treatment Plant West	21/07/2020	SD401	0089_SD401_200721	Direct_into_Bottle	0.5
Waste Water Treatment Plant West	23/09/2020	SD401	0089_SD401_200923	Direct_into_Bottle	0.45
Waste Water Treatment Plant West	16/12/2020	SD401	0089_SD401_201216	Shovel Trowel	0.8
Waste Water Treatment Plant West	8/06/2021	SD401	0089_SD401_210608	Direct_into_Bottle,Shov	0.1
Waste Water Treatment Plant West	30/08/2021	SD401	0089_SD401_210608	Direct_into_Bottle,Shov	0.5
	17/03/2021	SD307	0089_SD307_210317	Shovel/Trowel	0.2

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling	Constituent:	PFOS+PFHxS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW288	MW289	MW264	MW268	MW269	MW226	MW227
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	1-Aug-17			1.563	0.35	0.364	0.006	0.002
2	18-Sep-17	9.67	1.95	1.038	0.445	0.59	0.004	0.003
3	17-Oct-17	9.91	2.29	1.021	0.402	0.61	0.005	0.0005
4	15-Nov-17	8.8	1.7	0.954	0.412	0.67	0.003	0.002
5	7-Dec-17	10.3	1.77	0.7	0.431	0.262	0.002	0.0005
6	15-Jan-18	8.56	1.58	1.128	0.4	0.55	0.003	0.001
7	19-Dec-19			2.55	0.8	1.56	0.0005	
8	31-Mar-20		0.62	1.35	0.49	1.11	0.0005	0.0005
9	15-Jul-20	13.1	1.01	1.41	0.39	0.82	0.0005	0.0005
10	24-Sep-20		3.08	0.99	0.37	1.04	0.0005	0.0005
11	15-Dec-20		1.72	1.41	0.2	0.65	0.0005	0.0005
12	17-Mar-21	6.59	0.97	1.35	0.3	1.07	0.0005	0.0005
13	9-Jun-21		2.52	1.25	0.28	1.05	0.0005	0.0005
14	31-Aug-21	5.87	1.01	0.54	0.41	1	0.0005	0.0005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.25	0.43	0.39	0.33	0.43	1.01	0.86
Mann-Kendall Statistic (S):		-10	-13	-5	-27	37	-58	-33
Confidence Factor:		86.2%	79.0%	58.5%	92.1%	97.6%	100.0%	97.5%
Concentration Trend:		Stable	Stable	Stable	Prob. Decreasing	Increasing	Decreasing	Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
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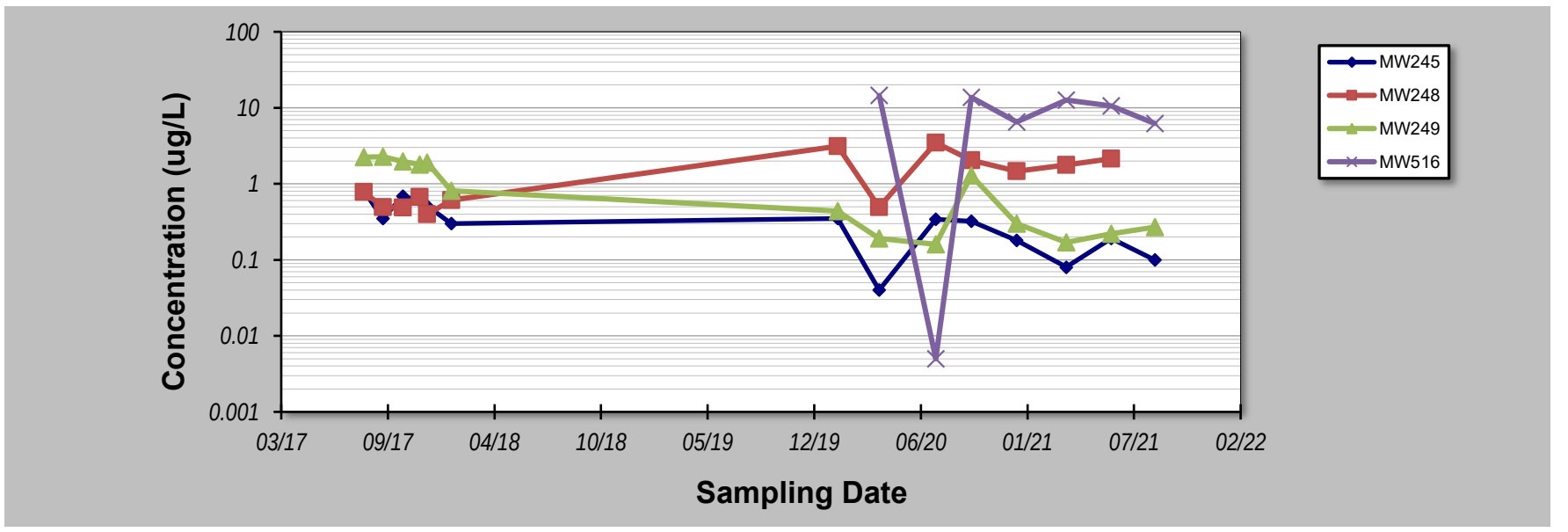
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **Nov-21**
Facility Name: **HMAS Stirling - AVCAT storage…**
Conducted By: **Cardno**

Job ID: **DE19009**
Constituent: **PFOS+PFHxS**
Concentration Units: **ug/L**

Sampling Point ID:	MW245	MW248	MW249	MW516			
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	8-Aug-17	0.81	0.778	2.25				
2	13-Sep-17	0.349	0.49	2.27				
3	20-Oct-17	0.69	0.485	1.97				
4	21-Nov-17	0.6	0.673	1.79				
5	5-Dec-17	0.51	0.396	1.9				
6	19-Jan-18	0.298	0.611	0.81				
7	14-Jan-20	0.35	3.12	0.44				
8	1-Apr-20	0.04	0.49	0.19	14.5			
9	16-Jul-20	0.34	3.47	0.16	0.005			
10	21-Sep-20	0.32	2.05	1.29	13.8			
11	15-Dec-20	0.18	1.46	0.3	6.53			
12	18-Mar-21	0.08	1.78	0.17	12.6			
13	10-Jun-21	0.19	2.14	0.22	10.6			
14	31-Aug-21	0.1		0.27	6.22			
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		**0.67**	**0.77**	**0.86**	**0.57**			
Mann-Kendall Statistic (S):		**-59**	**29**	**-59**	**-7**			
Confidence Factor:		**100.0%**	**95.6%**	**100.0%**	**80.9%**			
Concentration Trend:		Decreasing	Increasing	Decreasing	Stable			



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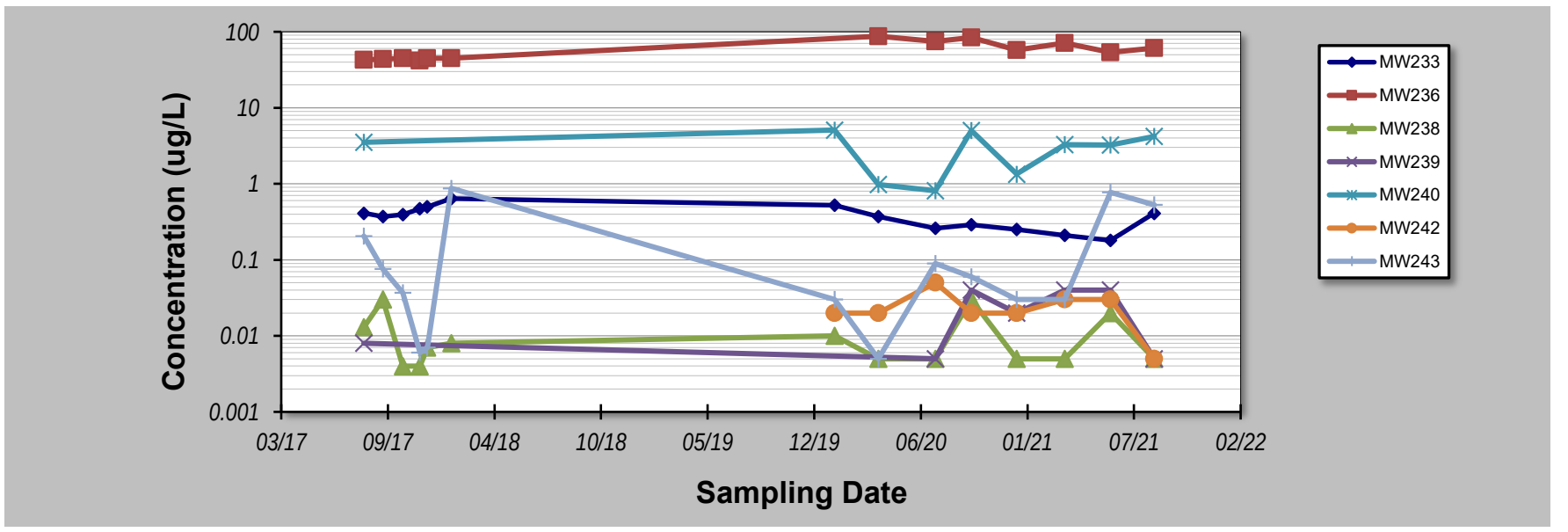
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **Nov-21**
Facility Name: **HMAS Stirling - AVCAT storage…**
Conducted By: **Cardno**

Job ID: **DE19009**
Constituent: **PFOS+PFHxS**
Concentration Units: **ug/L**

Sampling Point ID:	MW233	MW236	MW238	MW239	MW240	MW242	MW243
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	8-Aug-17	0.41	43	0.013	0.008	3.502		0.205
2	13-Sep-17	0.37	44	0.03				0.076
3	20-Oct-17	0.393	45	0.004				0.037
4	21-Nov-17	0.47	42	0.004				0.006
5	5-Dec-17	0.5	45	0.007				0.007
6	19-Jan-18	0.64	45	0.008				0.874
7	8-Jan-20	0.52		0.01		5.1	0.02	0.03
8	30-Mar-20	0.37	87.5	0.005		0.98	0.02	0.005
9	15-Jul-20	0.26	75	0.005	0.005	0.81	0.05	0.09
10	21-Sep-20	0.29	83.8	0.03	0.04	5	0.02	0.06
11	15-Dec-20	0.25	57.5	0.005	0.02	1.34	0.02	0.03
12	15-Mar-21	0.21	71.2	0.005	0.04	3.26	0.03	0.03
13	9-Jun-21	0.18	53.5	0.02	0.04	3.24	0.03	0.77
14	30-Aug-21	0.41	60.8	0.005	0.005	4.21	0.005	0.53
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.35	0.28	0.86	0.76	0.54	0.53	1.52
Mann-Kendall Statistic (S):		-35	35	-3	3	0	-1	6
Confidence Factor:		96.9%	98.2%	54.3%	61.4%	46.0%	50.0%	60.6%
Concentration Trend:		Decreasing	Increasing	Stable	No Trend	Stable	Stable	No Trend



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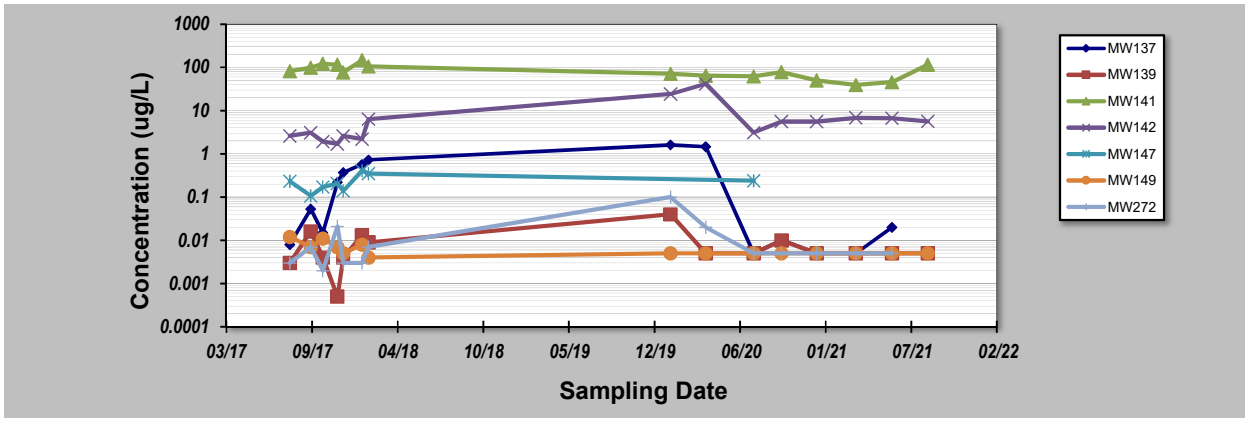
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling Demolition Ground	Constituent:	PFOS+PFHxS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW137	MW139	MW141	MW142	MW147	MW149	MW272
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	1-Aug-17	0.008	0.003	82	2.59	0.233	0.012	0.003
2	19-Sep-17	0.053	0.016	99	3.09	0.107	0.007	0.007
3	17-Oct-17	0.015	0.004	121	1.93	0.172	0.011	0.002
4	20-Nov-17	0.22	0.0005	116	1.7	0.208	0.007	0.021
5	4-Dec-17	0.37	0.004	77	2.6	0.14	0.005	0.003
6	17-Jan-18	0.57	0.013	147	2.2	0.41	0.008	0.003
7	1-Feb-18	0.73	0.009	106	6.4	0.349	0.004	0.007
8	8-Jan-20	1.61	0.04	71.5	24.3		0.005	0.1
9	30-Mar-20	1.47	0.005	64.3	41.8		0.005	0.02
10	20-Jul-20	0.005	0.005	62.4	3.1	0.24	0.005	0.005
11	23-Sep-20	0.01	0.01	78.1	5.58		0.005	0.005
12	14-Dec-20	0.005	0.005	50.1	5.61		0.005	0.005
13	16-Mar-21	0.005	0.005	39.1	6.83		0.005	0.005
14	8-Jun-21	0.02	0.005	45.7	6.71		0.005	0.005
15	31-Aug-21		0.005	116	5.66		0.005	
16								
17								
18								
19								
20								
Coefficient of Variation:		1.52	1.11	0.37	1.35	0.44	0.38	1.87
Mann-Kendall Statistic (S):		-4	11	-46	49	10	-44	9
Confidence Factor:		56.4%	68.7%	98.8%	99.2%	86.2%	98.4%	66.6%
Concentration Trend:		No Trend	No Trend	Decreasing	Increasing	No Trend	Decreasing	No Trend



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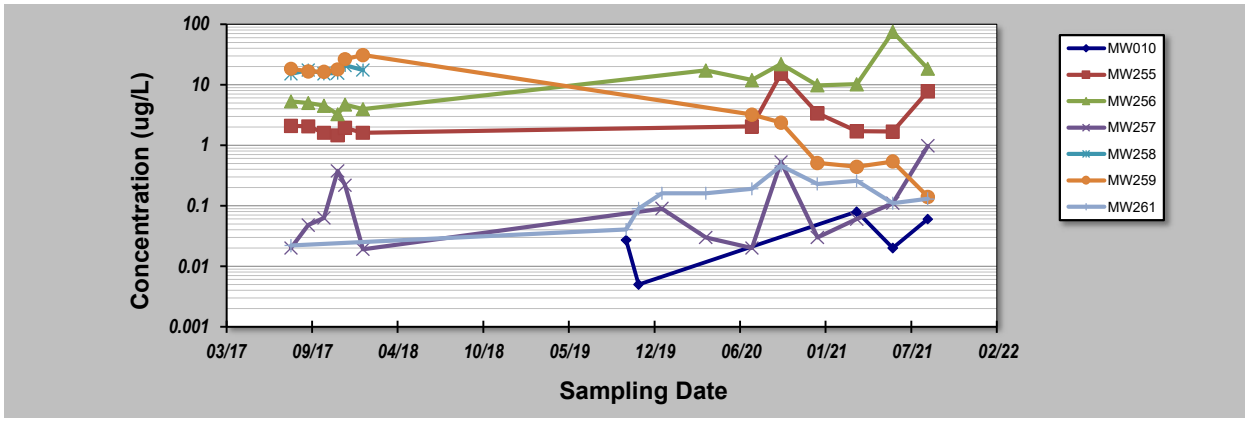
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - Fire Stn, dredge spoil…	Constituent:	PFOS+PFHxS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW010	MW255	MW256	MW257	MW258	MW259	MW261
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	4-Aug-17		2.1	5.29	0.02	15.2	18.4	0.022
2	13-Sep-17		2.05	4.99	0.048	17.5	16.6	
3	20-Oct-17		1.6	4.51	0.063	15.3	16.3	
4	21-Nov-17		1.46	3.27	0.376	15.6	18	
5	8-Dec-17		1.94	4.7	0.219	21	26.6	
6	19-Jan-18		1.61	3.98	0.019	17.5	30.9	
7	26-Sep-19	0.027						0.0408
8	25-Oct-19	0.005						0.09
9	19-Dec-19				0.09			0.16
10	30-Mar-20			17.2	0.03			0.16
11	16-Jul-20		2.04	11.9	0.02		3.2	0.19
12	22-Sep-20		15.3	22	0.53		2.36	0.46
13	16-Dec-20		3.38	9.8	0.03		0.51	0.23
14	18-Mar-21	0.08	1.7	10.2	0.06		0.44	0.26
15	10-Jun-21	0.02	1.68	75	0.11		0.54	0.11
16	31-Aug-21	0.06	7.79	18.4	0.98		0.14	0.13
17								
18								
19								
20								
Coefficient of Variation:		0.80	1.15	1.30	1.48	0.13	1.01	0.72
Mann-Kendall Statistic (S):		2	10	36	23	8	-40	26
Confidence Factor:		59.2%	72.7%	98.5%	88.3%	89.8%	99.7%	97.5%
Concentration Trend:		No Trend	No Trend	Increasing	No Trend	No Trend	Decreasing	Increasing



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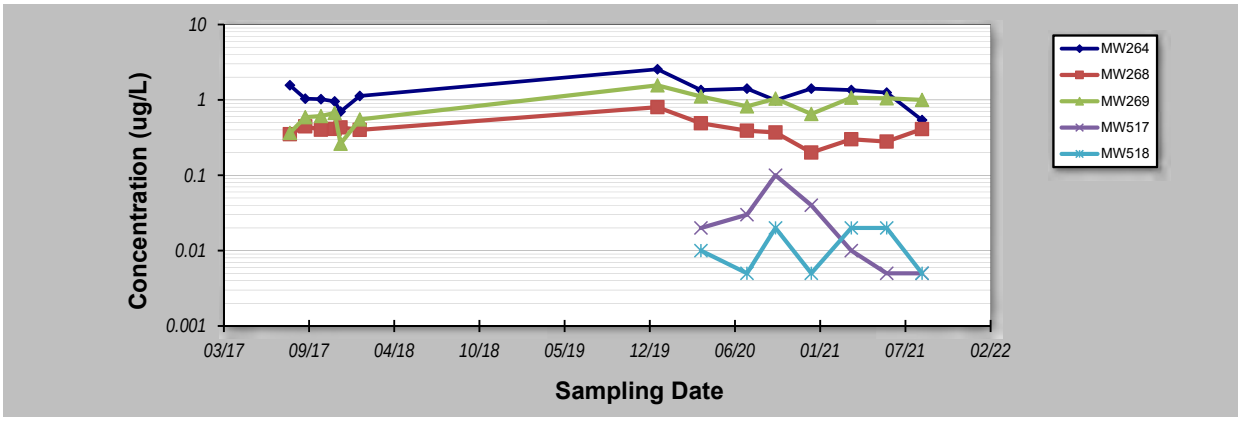
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - Fire Stn, dredge spoil…	Constituent:	PFOS+PFHxS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW264	MW268	MW269	MW517	MW518		
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	8-Aug-17	1.563	0.35	0.364				
2	13-Sep-17	1.038	0.445	0.59				
3	20-Oct-17	1.021	0.402	0.61				
4	21-Nov-17	0.954	0.412	0.67				
5	5-Dec-17	0.7	0.431	0.262				
6	19-Jan-18	1.128	0.4	0.55				
7	19-Dec-19	2.55	0.8	1.56				
8	30-Mar-20	1.35	0.49	1.11	0.02	0.01		
9	16-Jul-20	1.41	0.39	0.82	0.03	0.005		
10	21-Sep-20	0.99	0.37	1.04	0.1	0.02		
11	14-Dec-20	1.41	0.2	0.65	0.04	0.005		
12	18-Mar-21	1.35	0.3	1.07	0.01	0.02		
13	9-Jun-21	1.25	0.28	1.05	0.005	0.02		
14	31-Aug-21	0.54	0.41	1	0.005	0.005		
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.39	0.33	0.43	1.12	0.62		
Mann-Kendall Statistic (S):		-5	-27	37	-10	1		
Confidence Factor:		58.5%	92.1%	97.6%	90.7%	50.0%		
Concentration Trend:		Stable	Prob. Decreasing	Increasing	Prob. Decreasing	No Trend		



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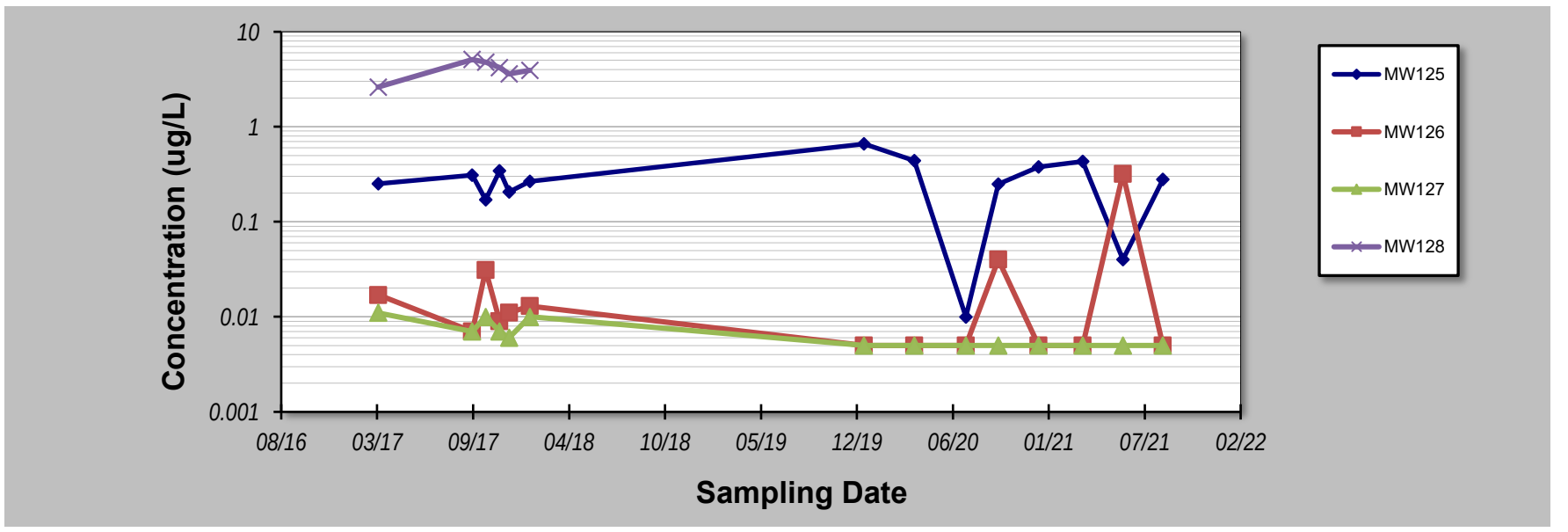
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - FTA	Constituent:	PFOS+PFHxS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW125	MW126	MW127	MW128			
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	8-Mar-17	0.251	0.017	0.011	2.62			
2	20-Sep-17	0.311	0.007	0.007	5.099			
3	18-Oct-17	0.171	0.031	0.01	4.8			
4	16-Nov-17	0.343	0.009	0.007	4.192			
5	6-Dec-17	0.207	0.011	0.006	3.592			
6	18-Jan-18	0.267	0.013	0.01	3.92			
7	16-Dec-19	0.66	0.005	0.005				
8	30-Mar-20	0.44	0.005	0.005				
9	15-Jul-20	0.01	0.005	0.005				
10	21-Sep-20	0.25	0.04	0.005				
11	14-Dec-20	0.38	0.005	0.005				
12	16-Mar-21	0.43	0.005	0.005				
13	8-Jun-21	0.04	0.32	0.005				
14	30-Aug-21	0.28	0.005	0.005				
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.57	2.43	0.34	0.22			
Mann-Kendall Statistic (S):		5	-18	-53	-3			
Confidence Factor:		58.5%	82.1%	99.8%	64.0%			
Concentration Trend:		No Trend	No Trend	Decreasing	Stable			



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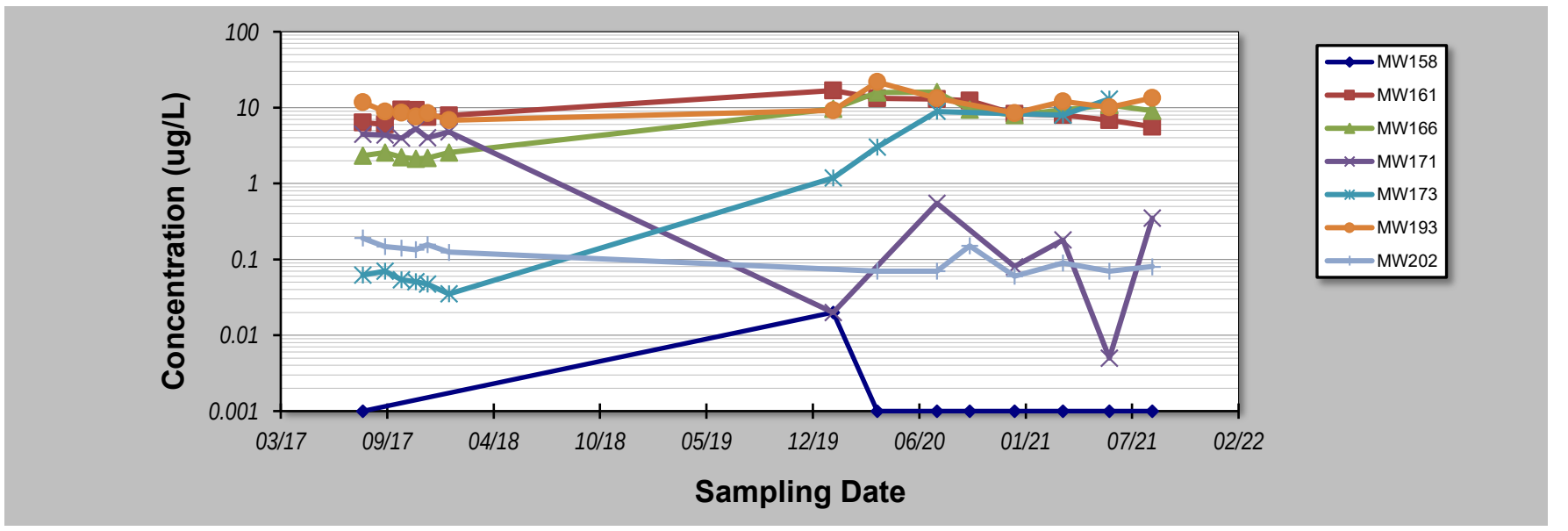
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **Nov-21**
Facility Name: **HMAS Stirling - WWTP**
Conducted By: **Cardno**

Job ID: **DEF19009**
Constituent: **PFOS+PFHxS**
Concentration Units: **ug/L**

Sampling Point ID:	MW158	MW161	MW166	MW171	MW173	MW193	MW202
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	7-Aug-17	0.001	6.38	2.32	4.47	0.062	11.8	0.19
2	18-Sep-17		6	2.54	4.33	0.07	8.9	0.147
3	19-Oct-17		9.4	2.22	3.97	0.054	8.5	0.141
4	15-Nov-17		9.31	2.11	5.28	0.051	7.6	0.134
5	7-Dec-17		7.48	2.17	3.99	0.047	8.4	0.156
6	16-Jan-18		7.84	2.54	4.79	0.035	6.8	0.124
7	8-Jan-20	0.02	16.8	9.67	0.02	1.19	9.21	
8	31-Mar-20	0.001	13.2	15.9		3.01	21.7	0.07
9	21-Jul-20	0.001	13	16	0.55	8.91	13.3	0.07
10	21-Sep-20	0.001	12.3	9.36				0.15
11	14-Dec-20	0.001	8.21	8	0.08		8.43	0.06
12	15-Mar-21	0.001	7.97		0.18	7.99	12.1	0.09
13	10-Jun-21	0.001	6.8	10.8	0.005	13	10.1	0.07
14	30-Aug-21	0.001	5.59	9.11	0.35		13.4	0.08
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		2.04	0.36	0.73	0.97	1.48	0.36	0.37
Mann-Kendall Statistic (S):		-6	-5	33	-34	25	20	-41
Confidence Factor:		69.4%	58.5%	97.5%	99.0%	97.0%	87.4%	99.4%
Concentration Trend:		No Trend	Stable	Increasing	Decreasing	Increasing	No Trend	Decreasing



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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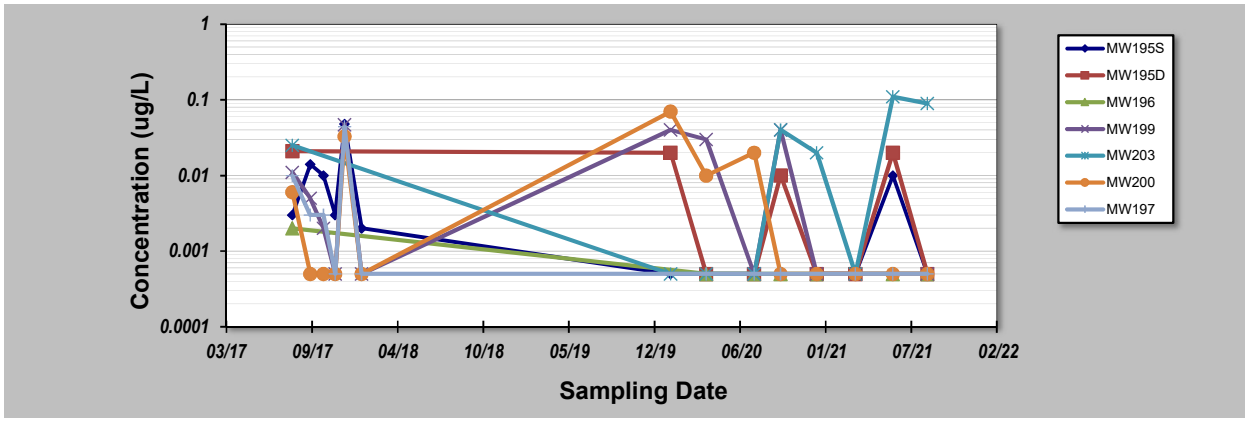
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - WWTP	Constituent:	PFOS+PFHxS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW195S	MW195D	MW196	MW199	MW203	MW200	MW197
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	7-Aug-17	0.003	0.021	0.002	0.011	0.025	0.006	0.01
2	18-Sep-17	0.014			0.005		0.0005	0.003
3	19-Oct-17	0.01			0.002		0.0005	0.003
4	15-Nov-17	0.003			0.0005		0.0005	0.0005
5	7-Dec-17	0.048			0.047		0.033	0.044
6	16-Jan-18	0.002			0.0005		0.0005	0.0005
7	8-Jan-20	0.0005	0.02		0.04	0.0005	0.07	
8	31-Mar-20	0.0005	0.0005	0.0005	0.03	0.0005	0.01	0.0005
9	21-Jul-20	0.0005	0.0005	0.0005	0.0005	0.0005	0.02	0.0005
10	21-Sep-20	0.0005	0.01	0.0005	0.04	0.04	0.0005	0.0005
11	14-Dec-20	0.0005	0.0005	0.0005	0.0005	0.02	0.0005	
12	15-Mar-21	0.0005	0.0005			0.0005	0.0005	0.0005
13	10-Jun-21	0.01	0.02	0.0005		0.11	0.0005	0.0005
14	30-Aug-21	0.0005	0.0005	0.0005	0.0005	0.09	0.0005	0.0005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.90	1.18	0.79	1.26	1.30	1.92	2.34
Mann-Kendall Statistic (S):		-38	-11	-6	-13	12	-13	-29
Confidence Factor:		97.9%	84.6%	76.4%	79.0%	87.0%	74.1%	97.4%
Concentration Trend:		Decreasing	No Trend	Stable	No Trend	No Trend	No Trend	Decreasing



Notes:

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3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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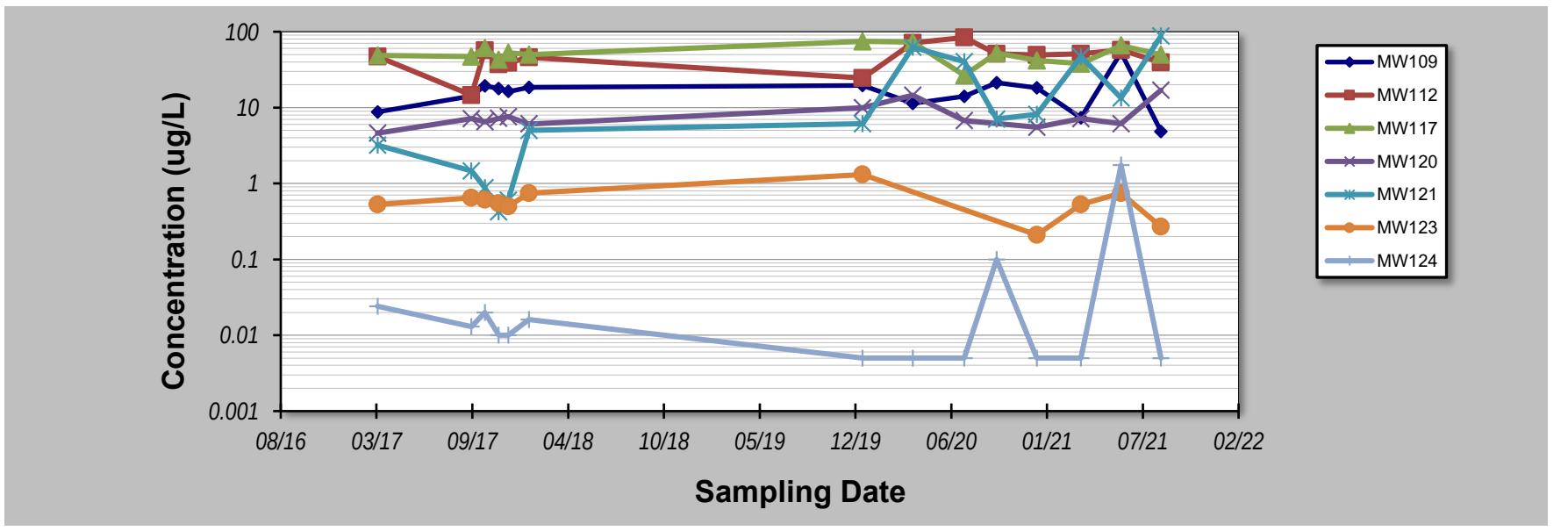
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **Nov-21**
Facility Name: **HMAS Stirling - FTA**
Conducted By: **Cardno**

Job ID: **DEF19009**
Constituent: **PFOS+PFHxS**
Concentration Units: **ug/L**

Sampling Point ID:	MW109	MW112	MW117	MW120	MW121	MW123	MW124
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	8-Mar-17	8.8	47	49	4.6	3.2	0.53	0.024
2	20-Sep-17	14.3	14.6	47	7.19	1.47	0.65	0.013
3	18-Oct-17	19.4	57	61	6.5	0.88	0.61	0.02
4	16-Nov-17	17.8	36.9	43	7.2	0.42	0.55	0.01
5	6-Dec-17	16.3	39	53	7.6	0.6	0.5	0.01
6	18-Jan-18	18.4	45.7	50	6.1	5	0.75	0.016
7	16-Dec-19	19.5	24.5	74.6	9.98	6.11	1.31	0.005
8	30-Mar-20	11.4	71	72.6	14.6	62.8		0.005
9	15-Jul-20	14.1	83.9	26.6	6.75	40.4		0.005
10	21-Sep-20	21.3	51.2	52.1		7.09		0.1
11	14-Dec-20	18.3	49.1	42	5.52	8.12	0.21	0.005
12	16-Mar-21	7.36	51	38	7.14	47	0.53	0.005
13	8-Jun-21	53.2	57.2	65.9	6.13	13.4	0.75	1.74
14	30-Aug-21	4.87	39.3	49.8	17	87.9	0.27	0.005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.65	0.37	0.26	0.44	1.37	0.48	3.29
Mann-Kendall Statistic (S):		3	23	-5	16	55	-5	-25
Confidence Factor:		54.3%	88.3%	58.5%	81.6%	99.9%	61.9%	90.4%
Concentration Trend:		No Trend	No Trend	Stable	No Trend	Increasing	Stable	Prob. Decreasing



Notes:

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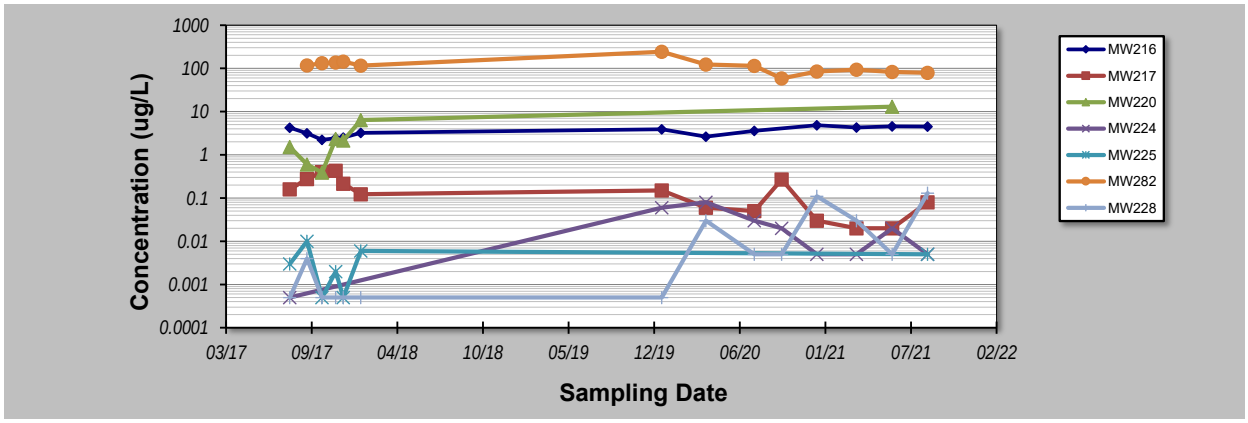
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - HSF	Constituent:	PFOS+PFHxS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW216	MW217	MW220	MW224	MW225	MW282	MW228
Sampling Event	Sampling Date	PFOS+PFHXS CONCENTRATION (ug/L)						
1	2-Aug-17	4.258	0.16	1.52	0.0005	0.003		0.0005
2	11-Sep-17	3.14	0.277	0.6		0.01	117	0.004
3	16-Oct-17	2.228	0.4	0.39		0.0005	133	0.0005
4	17-Nov-17	2.42	0.43	2.34		0.002	137	0.0005
5	5-Dec-17	2.524	0.214	2.16		0.0005	144	0.0005
6	15-Jan-18	3.236	0.122	6.4		0.006	116	0.0005
7	19-Dec-19	3.89	0.15		0.06		243	0.0005
8	31-Mar-20	2.65	0.06		0.08		123	0.03
9	22-Jul-20	3.61	0.05		0.03		115	0.005
10	24-Sep-20		0.27		0.02		58.6	0.005
11	15-Dec-20	4.85	0.03		0.005		85.3	0.11
12	18-Mar-21	4.3	0.02		0.005		94	0.03
13	9-Jun-21	4.57	0.02	13	0.02		83	0.005
14	31-Aug-21	4.49	0.08		0.005	0.005	79.1	0.13
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.26	0.84	1.20	1.10	0.89	0.39	1.85
Mann-Kendall Statistic (S):		40	-52	13	-10	0	-42	50
Confidence Factor:		99.3%	99.8%	96.5%	82.1%	37.9%	99.5%	99.8%
Concentration Trend:		Increasing	Decreasing	Increasing	No Trend	Stable	Decreasing	Increasing



Notes:

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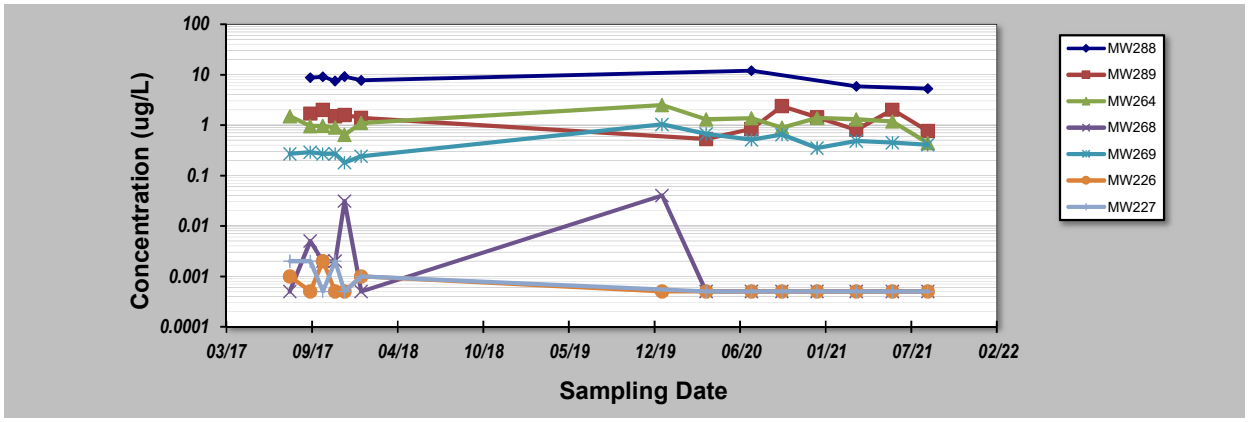
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling	Constituent:	PFOS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW288	MW289	MW264	MW268	MW269	MW226	MW227
Sampling Event	Sampling Date	PFOS CONCENTRATION (ug/L)						
1	1-Aug-17			1.5	0.0005	0.27	0.001	0.002
2	18-Sep-17	8.7	1.7	0.96	0.005	0.29	0.0005	0.002
3	17-Oct-17	9.1	2	0.97	0.002	0.27	0.002	0.0005
4	15-Nov-17	7.5	1.5	0.9	0.002	0.27	0.0005	0.002
5	7-Dec-17	9.2	1.6	0.64	0.031	0.18	0.0005	0.0005
6	15-Jan-18	7.7	1.4	1.1	0.0005	0.24	0.001	0.001
7	19-Dec-19			2.5	0.04	1.03	0.0005	
8	31-Mar-20		0.53	1.3	0.0005	0.67	0.0005	0.0005
9	15-Jul-20	12	0.84	1.37	0.0005	0.51	0.0005	0.0005
10	24-Sep-20		2.37	0.89	0.0005	0.65	0.0005	0.0005
11	15-Dec-20		1.42	1.38	0.0005	0.35	0.0005	0.0005
12	17-Mar-21	5.85	0.8	1.3	0.0005	0.48	0.0005	0.0005
13	9-Jun-21		2.01	1.19	0.0005	0.45	0.0005	0.0005
14	31-Aug-21	5.3	0.76	0.44	0.0005	0.41	0.0005	0.0005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.26	0.41	0.41	2.10	0.53	0.62	0.74
Mann-Kendall Statistic (S):		-8	-18	-4	-28	20	-25	-33
Confidence Factor:		80.1%	87.5%	56.4%	92.9%	84.8%	90.4%	97.5%
Concentration Trend:		Stable	Stable	Stable	Prob. Decreasing	No Trend	Prob. Decreasing	Decreasing



Notes:

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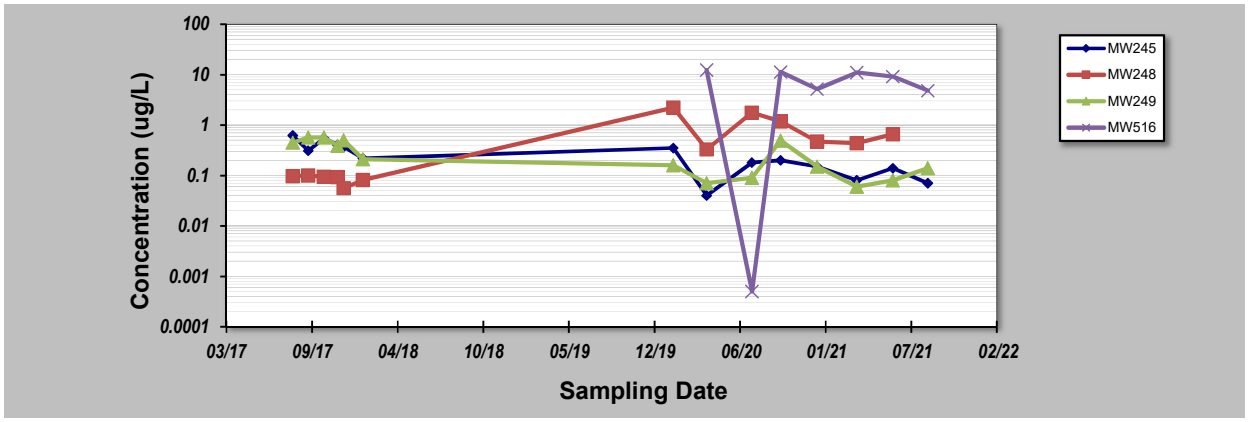
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DE19009
Facility Name:	HMAS Stirling - AVCAT storage…	Constituent:	PFOS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW245	MW248	MW249	MW516			
Sampling Event	Sampling Date	PFOS CONCENTRATION (ug/L)						
1	8-Aug-17	0.62	0.098	0.45				
2	13-Sep-17	0.31	0.1	0.57				
3	20-Oct-17	0.55	0.095	0.57				
4	21-Nov-17	0.4	0.093	0.39				
5	5-Dec-17	0.37	0.056	0.5				
6	19-Jan-18	0.22	0.081	0.21				
7	14-Jan-20	0.35	2.22	0.16				
8	1-Apr-20	0.04	0.33	0.07	12.3			
9	16-Jul-20	0.18	1.77	0.09	0.0005			
10	21-Sep-20	0.2	1.19	0.49	11.3			
11	15-Dec-20	0.15	0.47	0.15	5.15			
12	18-Mar-21	0.08	0.44	0.06	11			
13	10-Jun-21	0.14	0.66	0.08	9.21			
14	31-Aug-21	0.07		0.14	4.8			
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.68	1.21	0.72	0.59			
Mann-Kendall Statistic (S):		-65	24	-52	-7			
Confidence Factor:		>99.9%	91.8%	99.8%	80.9%			
Concentration Trend:		Decreasing	Prob. Increasing	Decreasing	Stable			



Notes:

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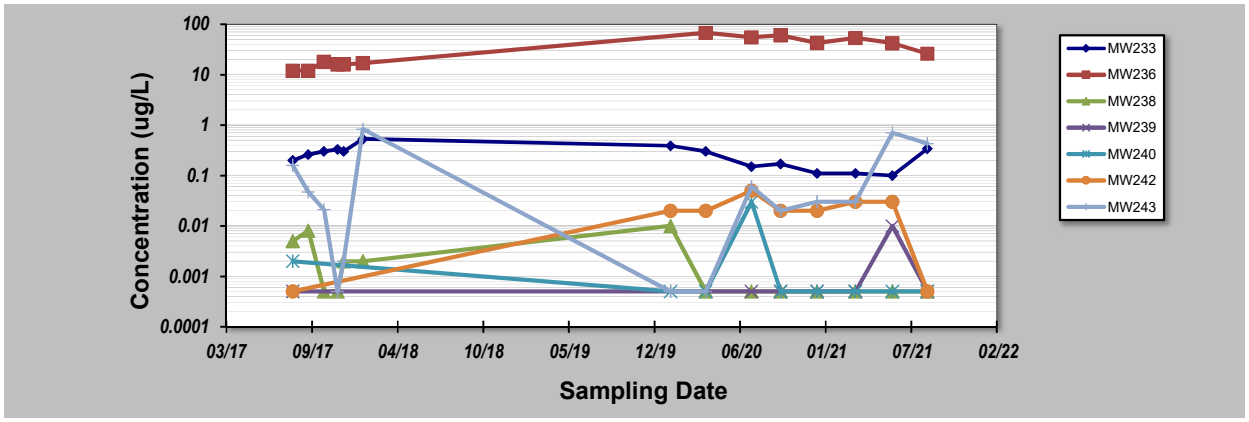
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DE19009
Facility Name:	HMAS Stirling - AVCAT storage…	Constituent:	PFOS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW233	MW236	MW238	MW239	MW240	MW242	MW243
Sampling Event	Sampling Date	PFOS CONCENTRATION (ug/L)						
1	8-Aug-17	0.2	12	0.005	0.0005	0.002	0.0005	0.16
2	13-Sep-17	0.26	12	0.008				0.047
3	20-Oct-17	0.3	18	0.0005				0.021
4	21-Nov-17	0.33	16	0.0005				0.0005
5	5-Dec-17	0.3	16	0.002				0.002
6	19-Jan-18	0.53	17	0.002				0.83
7	8-Jan-20	0.39		0.01		0.0005	0.02	0.0005
8	30-Mar-20	0.3	67.7	0.0005		0.0005	0.02	0.0005
9	15-Jul-20	0.15	55.2	0.0005	0.0005	0.03	0.05	0.06
10	21-Sep-20	0.17	60.6	0.0005	0.0005	0.0005	0.02	0.02
11	15-Dec-20	0.11	42.6	0.0005	0.0005	0.0005	0.02	0.03
12	15-Mar-21	0.11	53.4	0.0005	0.0005	0.0005	0.03	0.03
13	9-Jun-21	0.1	42.2	0.0005	0.01	0.0005	0.03	0.7
14	30-Aug-21	0.34	26	0.0005	0.0005	0.0005	0.0005	0.43
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.48	0.61	1.40	1.93	2.48	0.72	1.67
Mann-Kendall Statistic (S):		-23	32	-32	4	-9	6	13
Confidence Factor:		88.3%	97.1%	95.5%	66.7%	79.2%	69.4%	74.1%
Concentration Trend:		Stable	Increasing	Decreasing	No Trend	No Trend	No Trend	No Trend



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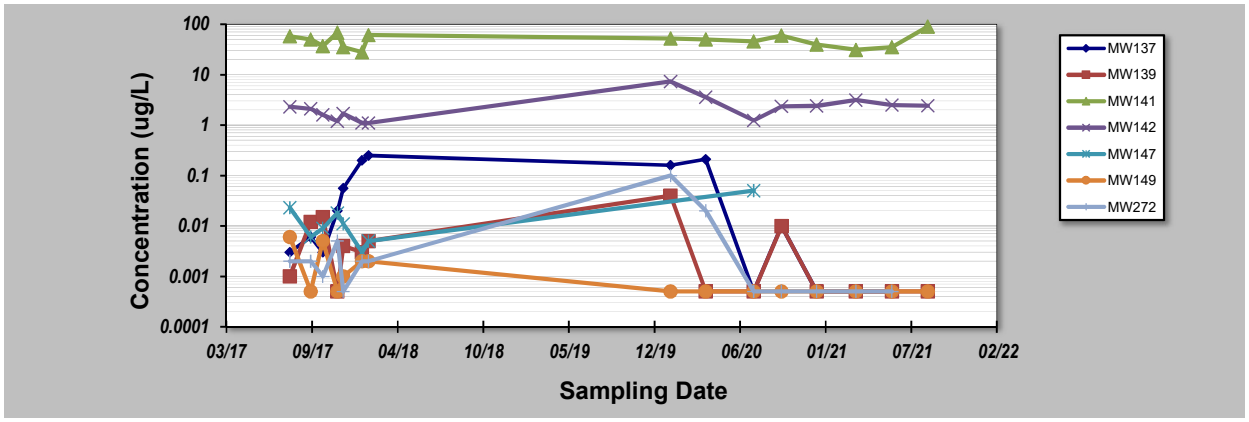
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling Demolition Ground	Constituent:	PFOS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW137	MW139	MW141	MW142	MW147	MW149	MW272
Sampling Event	Sampling Date	PFOS CONCENTRATION (ug/L)						
1	1-Aug-17	0.003	0.001	58	2.3	0.023	0.006	0.002
2	19-Sep-17	0.006	0.012	50	2.1	0.006	0.0005	0.002
3	17-Oct-17	0.003	0.015	37	1.6	0.009	0.005	0.001
4	20-Nov-17	0.02	0.0005	68	1.2	0.018	0.0005	0.005
5	4-Dec-17	0.056	0.004	35	1.7	0.011	0.001	0.0005
6	17-Jan-18	0.2	0.003	28	1.1	0.003	0.002	0.002
7	1-Feb-18	0.25	0.005	61	1.1	0.005	0.002	0.002
8	8-Jan-20	0.16	0.04	52.1	7.34		0.0005	0.1
9	30-Mar-20	0.21	0.0005	50	3.59		0.0005	0.02
10	20-Jul-20	0.0005	0.0005	45.7	1.23	0.05	0.0005	0.0005
11	23-Sep-20	0.01	0.01	59.9	2.36		0.0005	0.0005
12	14-Dec-20	0.0005	0.0005	39.8	2.4		0.0005	0.0005
13	16-Mar-21	0.0005	0.0005	31	3.13		0.0005	0.0005
14	8-Jun-21	0.0005	0.0005	34.9	2.5		0.0005	0.0005
15	31-Aug-21		0.0005	89.9	2.42		0.0005	
16								
17								
18								
19								
20								
Coefficient of Variation:		1.43	1.68	0.33	0.65	0.99	1.25	2.70
Mann-Kendall Statistic (S):		-14	-34	-12	28	-2	-41	-28
Confidence Factor:		75.8%	94.9%	70.4%	90.8%	54.8%	97.7%	92.9%
Concentration Trend:		No Trend	Prob. Decreasing	Stable	Prob. Increasing	Stable	Decreasing	Prob. Decreasing



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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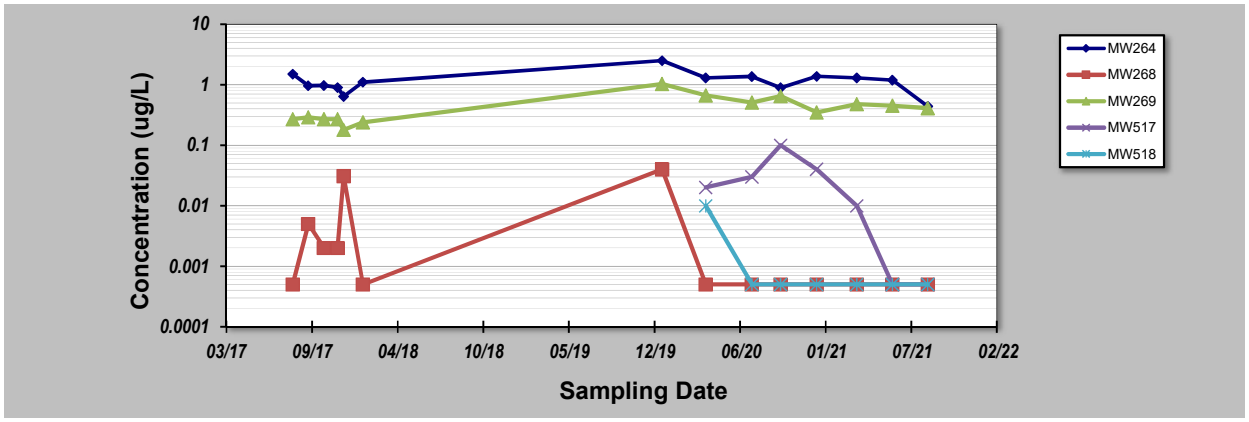
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - Fire Stn, dredge spoil…	Constituent:	PFOS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW264	MW268	MW269	MW517	MW518		
Sampling Event	Sampling Date	PFOS CONCENTRATION (ug/L)						
1	8-Aug-17	1.5	0.0005	0.27				
2	13-Sep-17	0.96	0.005	0.29				
3	20-Oct-17	0.97	0.002	0.27				
4	21-Nov-17	0.9	0.002	0.27				
5	5-Dec-17	0.64	0.031	0.18				
6	19-Jan-18	1.1	0.0005	0.24				
7	19-Dec-19	2.5	0.04	1.03				
8	30-Mar-20	1.3	0.0005	0.67	0.02	0.01		
9	16-Jul-20	1.37	0.0005	0.51	0.03	0.0005		
10	21-Sep-20	0.89	0.0005	0.65	0.1	0.0005		
11	14-Dec-20	1.38	0.0005	0.35	0.04	0.0005		
12	18-Mar-21	1.3	0.0005	0.48	0.01	0.0005		
13	9-Jun-21	1.19	0.0005	0.45	0.0005	0.0005		
14	31-Aug-21	0.44	0.0005	0.41	0.0005	0.0005		
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.41	2.10	0.53	1.21	1.93		
Mann-Kendall Statistic (S):		-4	-28	20	-10	-6		
Confidence Factor:		56.4%	92.9%	84.8%	90.7%	76.4%		
Concentration Trend:		Stable	Prob. Decreasing	No Trend	Prob. Decreasing	No Trend		



Notes:

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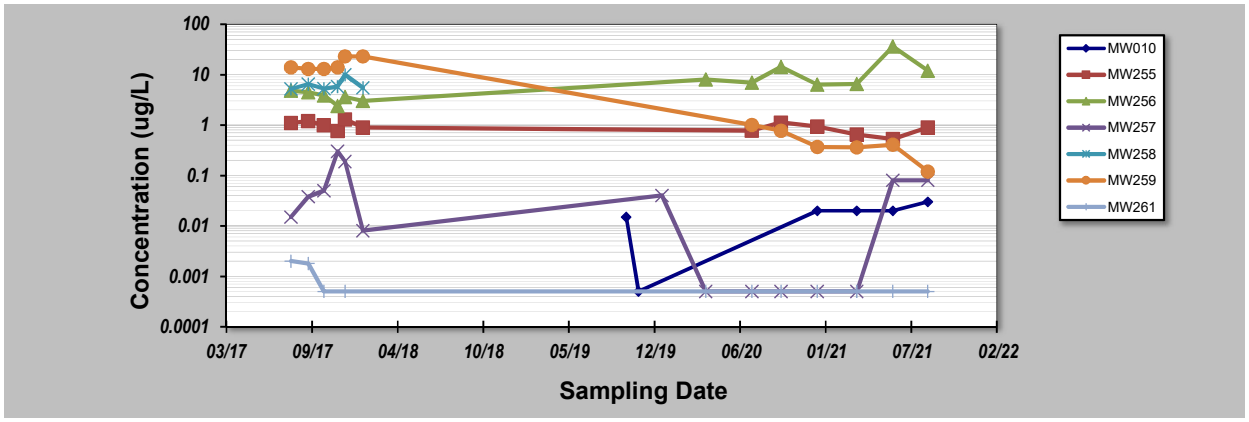
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - Fire Stn, dredge spoil…	Constituent:	PFOS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW010	MW255	MW256	MW257	MW258	MW259	MW261
Sampling Event	Sampling Date	PFOS CONCENTRATION (ug/L)						
1	4-Aug-17		1.1	4.8	0.015	5.2	14	0.002
2	13-Sep-17		1.2	4.5	0.038	6.5	13	0.0018
3	20-Oct-17		1	3.9	0.05	5.3	13	0.0005
4	21-Nov-17		0.76	2.4	0.3	5.8	14	
5	8-Dec-17		1.3	3.6	0.19	10	23	0.0005
6	19-Jan-18		0.9	3	0.008	5.5	23	
7	26-Sep-19	0.015						
8	25-Oct-19	0.0005						
9	19-Dec-19				0.04			
10	30-Mar-20			8.05	0.0005			0.0005
11	16-Jul-20		0.78	6.96	0.0005		1.01	0.0005
12	22-Sep-20		1.13	14.3	0.0005		0.77	0.0005
13	16-Dec-20	0.02	0.94	6.33	0.0005		0.37	0.0005
14	18-Mar-21	0.02	0.65	6.55	0.0005		0.36	0.0005
15	10-Jun-21	0.02	0.53	36.2	0.08		0.41	0.0005
16	31-Aug-21	0.03	0.9	12	0.08		0.12	0.0005
17								
18								
19								
20								
Coefficient of Variation:		0.55	0.25	1.04	1.52	0.29	1.06	0.75
Mann-Kendall Statistic (S):		10	-27	34	-16	5	-39	-19
Confidence Factor:		95.2%	96.3%	97.9%	79.1%	76.5%	99.7%	91.8%
Concentration Trend:		Increasing	Decreasing	Increasing	No Trend	No Trend	Decreasing	Prob. Decreasing



Notes:

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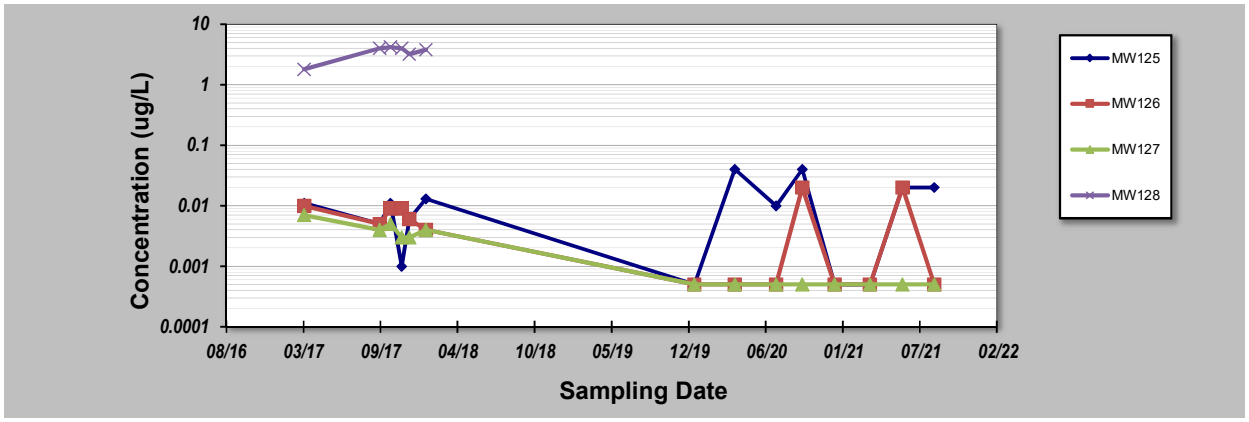
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - FTA	Constituent:	PFOS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW125	MW126	MW127	MW128			
Sampling Event	Sampling Date	PFOS CONCENTRATION (ug/L)						
1	8-Mar-17	0.011	0.01	0.007	1.8			
2	20-Sep-17	0.005	0.005	0.004	4			
3	18-Oct-17	0.011	0.009	0.005	4.2			
4	16-Nov-17	0.001	0.009	0.003	4			
5	6-Dec-17	0.006	0.006	0.003	3.2			
6	18-Jan-18	0.013	0.004	0.004	3.8			
7	16-Dec-19	0.0005	0.0005	0.0005				
8	30-Mar-20	0.04	0.0005	0.0005				
9	15-Jul-20	0.01	0.0005	0.0005				
10	21-Sep-20	0.04	0.02	0.0005				
11	14-Dec-20	0.0005	0.0005	0.0005				
12	16-Mar-21	0.0005	0.0005	0.0005				
13	8-Jun-21	0.02	0.02	0.0005				
14	30-Aug-21	0.02	0.0005	0.0005				
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.04	1.12	1.02	0.26			
Mann-Kendall Statistic (S):		9	-28	-55	0			
Confidence Factor:		66.6%	92.9%	99.9%	39.3%			
Concentration Trend:		No Trend	Prob. Decreasing	Decreasing	Stable			



Notes:

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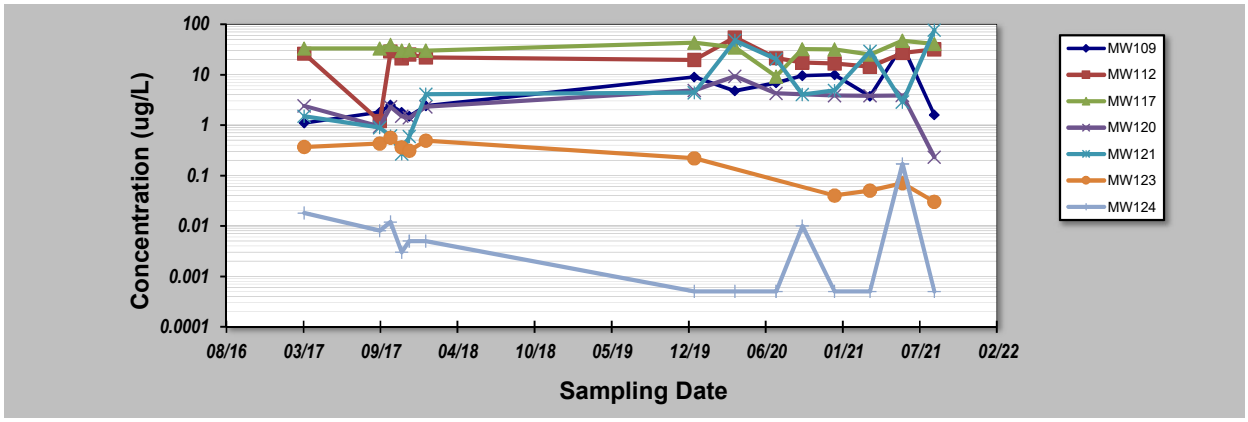
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - FTA	Constituent:	PFOS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW109	MW112	MW117	MW120	MW121	MW123	MW124
Sampling Event	Sampling Date	PFOS CONCENTRATION (ug/L)						
1	8-Mar-17	1.1	26	33	2.4	1.5	0.37	0.018
2	20-Sep-17	1.8	1.2	33	0.94	0.89	0.43	0.008
3	18-Oct-17	2.5	29	39	2.3	0.61	0.56	0.012
4	16-Nov-17	1.8	21	30	1.5	0.27	0.36	0.003
5	6-Dec-17	1.5	25	31	1.4	0.6	0.31	0.005
6	18-Jan-18	2.4	22	30	2.3	4.1	0.49	0.005
7	16-Dec-19	8.96	19.6	43.1	4.86	4.39	0.22	0.0005
8	30-Mar-20	4.75	54.7	34.6	9.29	47.5		0.0005
9	15-Jul-20	6.89	21.2	9.22	4.28	20.1		0.0005
10	21-Sep-20	9.59	17.5	32.1		4.04		0.01
11	14-Dec-20	10	16.6	31.8	3.86	4.87	0.04	0.0005
12	16-Mar-21	3.72	14.4	25	3.81	29.3	0.05	0.0005
13	8-Jun-21	38	26.8	47.3	3.88	2.86	0.07	0.17
14	30-Aug-21	1.59	31.7	40.6	0.23	76.5	0.03	0.0005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.41	0.50	0.27	0.73	1.61	0.73	2.66
Mann-Kendall Statistic (S):		44	-5	3	13	43	-35	-31
Confidence Factor:		99.2%	58.5%	54.3%	76.4%	99.0%	99.7%	95.0%
Concentration Trend:		Increasing	Stable	No Trend	No Trend	Increasing	Decreasing	Prob. Decreasing



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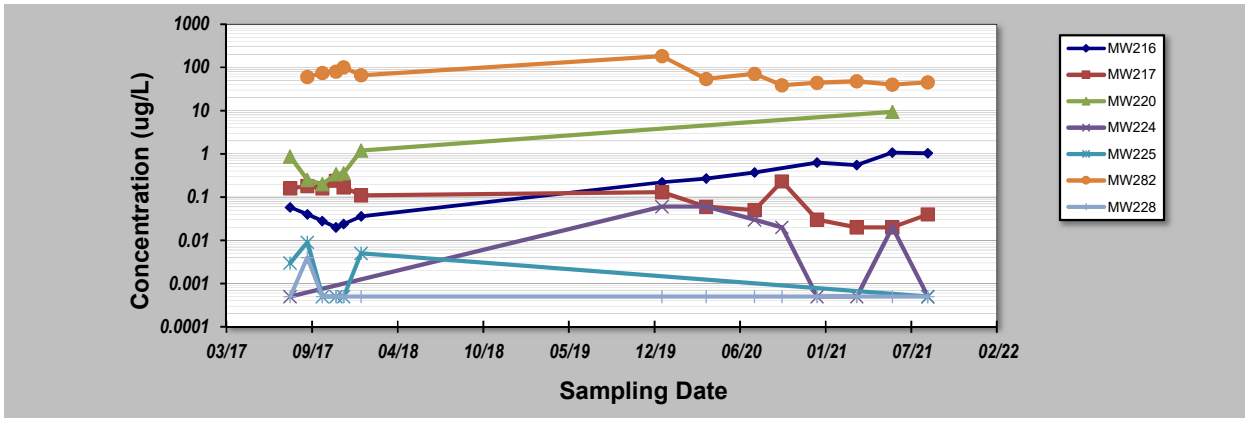
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - HSF	Constituent:	PFOS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW216	MW217	MW220	MW224	MW225	MW282	MW228
Sampling Event	Sampling Date	PFOS CONCENTRATION (ug/L)						
1	2-Aug-17	0.058	0.16	0.87	0.0005	0.003		0.0005
2	11-Sep-17	0.04	0.18	0.25		0.009	60	0.004
3	16-Oct-17	0.028	0.16	0.2		0.0005	75	0.0005
4	17-Nov-17	0.02	0.24	0.34		0.0005	80	0.0005
5	5-Dec-17	0.024	0.17	0.36		0.0005	100	0.0005
6	15-Jan-18	0.036	0.11	1.2		0.005	66	0.0005
7	19-Dec-19	0.22	0.13		0.06		183	0.0005
8	31-Mar-20	0.27	0.06		0.06		54.2	0.0005
9	22-Jul-20	0.37	0.05		0.03		71.5	0.0005
10	24-Sep-20		0.23		0.02		38.8	0.0005
11	15-Dec-20	0.63	0.03		0.0005		44.1	0.0005
12	18-Mar-21	0.55	0.02		0.0005		48.2	0.0005
13	9-Jun-21	1.07	0.02	9.38	0.02		40.3	0.0005
14	31-Aug-21	1.04	0.04		0.0005	0.0005	45.1	0.0005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.13	0.68	1.87	1.15	1.21	0.55	1.25
Mann-Kendall Statistic (S):		52	-53	11	-14	-5	-34	-11
Confidence Factor:		100.0%	99.8%	93.2%	91.0%	71.9%	97.9%	70.5%
Concentration Trend:		Increasing	Decreasing	Prob. Increasing	Prob. Decreasing	No Trend	Decreasing	No Trend



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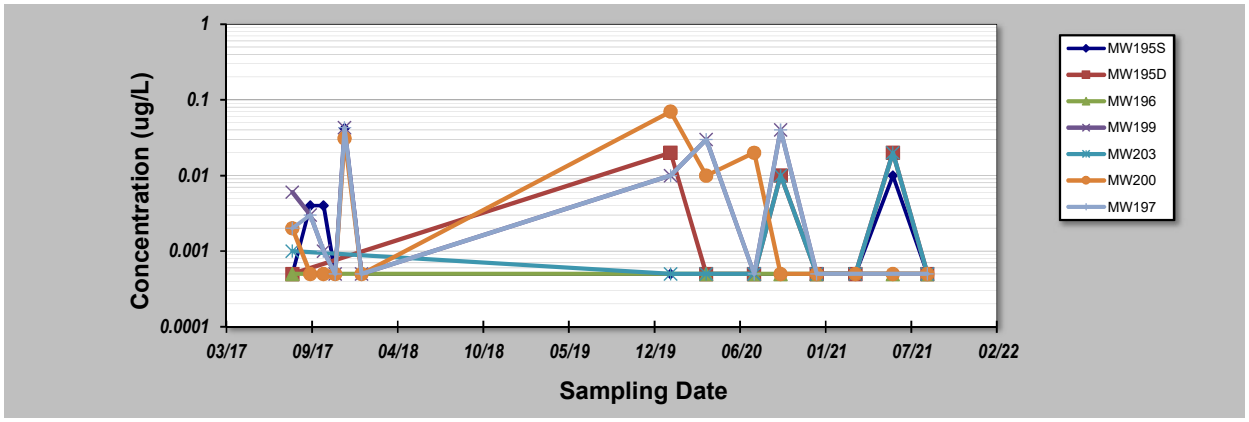
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - WWTP	Constituent:	PFOS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW195S	MW195D	MW196	MW199	MW203	MW200	MW197
Sampling Event	Sampling Date	PFOS CONCENTRATION (ug/L)						
1	7-Aug-17	0.0005	0.0005	0.0005	0.006	0.001	0.002	0.002
2	18-Sep-17	0.004			0.003		0.0005	0.003
3	19-Oct-17	0.004			0.001		0.0005	0.001
4	15-Nov-17	0.0005			0.0005		0.0005	0.0005
5	7-Dec-17	0.042			0.043		0.031	0.043
6	16-Jan-18	0.0005			0.0005		0.0005	0.0005
7	8-Jan-20	0.0005	0.02		0.01	0.0005	0.07	0.01
8	31-Mar-20	0.0005	0.0005	0.0005	0.03	0.0005	0.01	0.03
9	21-Jul-20	0.0005	0.0005	0.0005	0.0005	0.0005	0.02	0.0005
10	21-Sep-20	0.0005	0.01	0.0005	0.04	0.01	0.0005	0.04
11	14-Dec-20	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
12	15-Mar-21	0.0005	0.0005			0.0005	0.0005	
13	10-Jun-21	0.01	0.02	0.0005		0.02	0.0005	
14	30-Aug-21	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		2.39	1.46	0.00	1.45	1.81	2.00	1.51
Mann-Kendall Statistic (S):		-11	0	0	-10	1	-13	-8
Confidence Factor:		70.5%	46.0%	37.9%	72.7%	50.0%	74.1%	68.1%
Concentration Trend:		No Trend	No Trend	Stable	No Trend	No Trend	No Trend	No Trend



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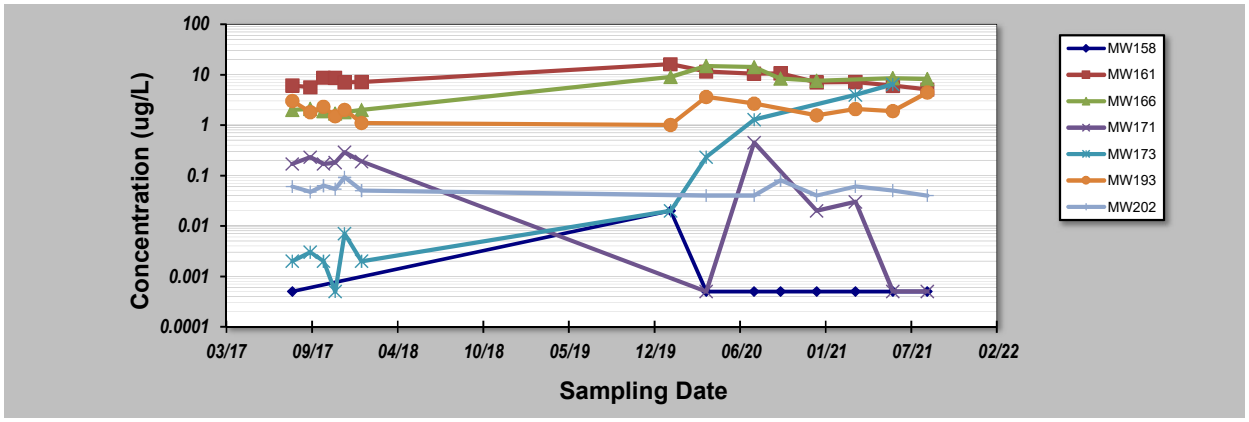
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - WWTP	Constituent:	PFOS
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW158	MW161	MW166	MW171	MW173	MW193	MW202
Sampling Event	Sampling Date	PFOS CONCENTRATION (ug/L)						
1	7-Aug-17	0.0005	6.1	2	0.17	0.002	3	0.06
2	18-Sep-17		5.6	2.1	0.23	0.003	1.8	0.047
3	19-Oct-17		8.7	1.9	0.17	0.002	2.3	0.063
4	15-Nov-17		8.6	1.7	0.18	0.0005	1.5	0.054
5	7-Dec-17		7	1.8	0.29	0.007	2	0.092
6	16-Jan-18		7.2	2	0.19	0.002	1.1	0.05
7	8-Jan-20	0.02	16.1	8.95		0.02	1.01	
8	31-Mar-20	0.0005	11.5	14.8	0.0005	0.23	3.62	0.04
9	21-Jul-20	0.0005	10.5	14.1	0.45	1.29	2.67	0.04
10	21-Sep-20	0.0005	10.6	8.39				0.08
11	14-Dec-20	0.0005	7.06	7.53	0.02		1.56	0.04
12	15-Mar-21	0.0005	7.16		0.03	3.97	2.08	0.06
13	10-Jun-21	0.0005	6.04	8.51	0.0005	6.41	1.9	0.05
14	30-Aug-21	0.0005	5.09	8.16	0.0005		4.45	0.04
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		2.44	0.35	0.75	0.97	1.97	0.44	0.29
Mann-Kendall Statistic (S):		-6	-7	27	-22	40	6	-20
Confidence Factor:		69.4%	62.6%	94.3%	92.4%	100.0%	61.7%	87.4%
Concentration Trend:		No Trend	Stable	Prob. Increasing	Prob. Decreasing	Increasing	No Trend	Stable



Notes:

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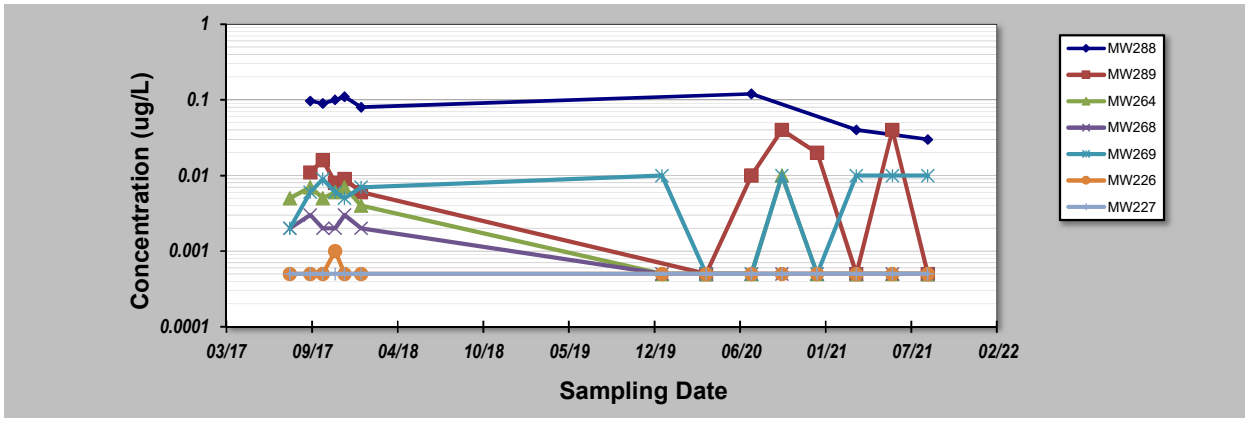
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling	Constituent:	PFOA
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW288	MW289	MW264	MW268	MW269	MW226	MW227
Sampling Event	Sampling Date	PFOA CONCENTRATION (ug/L)						
1	1-Aug-17			0.005	0.002	0.002	0.0005	0.0005
2	18-Sep-17	0.097	0.011	0.007	0.003	0.006	0.0005	0.0005
3	17-Oct-17	0.09	0.016	0.005	0.002	0.009	0.0005	0.0005
4	15-Nov-17	0.1	0.008	0.006	0.002	0.006	0.001	0.0005
5	7-Dec-17	0.11	0.009	0.007	0.003	0.005	0.0005	0.0005
6	15-Jan-18	0.08	0.006	0.004	0.002	0.007	0.0005	0.0005
7	19-Dec-19			0.0005	0.0005	0.01	0.0005	
8	31-Mar-20		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
9	15-Jul-20	0.12	0.01	0.0005	0.0005	0.0005	0.0005	0.0005
10	24-Sep-20		0.04	0.01	0.0005	0.01	0.0005	0.0005
11	15-Dec-20		0.02	0.0005	0.0005	0.0005	0.0005	0.0005
12	17-Mar-21	0.04	0.0005	0.0005	0.0005	0.01	0.0005	0.0005
13	9-Jun-21		0.04	0.0005	0.0005	0.01	0.0005	0.0005
14	31-Aug-21	0.03	0.0005	0.0005	0.0005	0.01	0.0005	0.0005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.39	1.02	0.97	0.77	0.63	0.25	0.00
Mann-Kendall Statistic (S):		-8	-4	-38	-48	23	-7	0
Confidence Factor:		80.1%	58.0%	97.9%	99.6%	88.3%	62.6%	47.6%
Concentration Trend:		Stable	No Trend	Decreasing	Decreasing	No Trend	Stable	Stable



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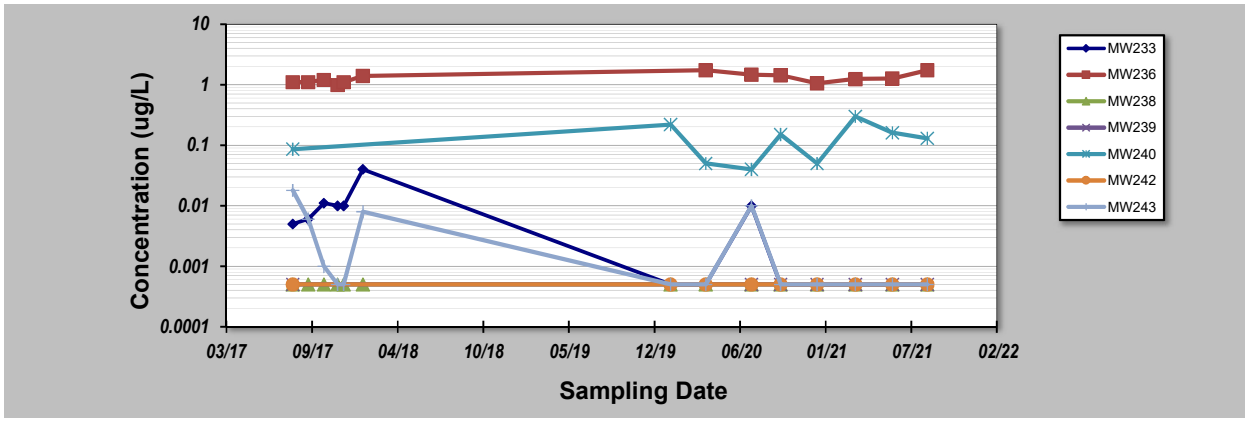
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - AVCAT storage…	Constituent:	PFOA
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW233	MW236	MW238	MW239	MW240	MW242	MW243
Sampling Event	Sampling Date	PFOA CONCENTRATION (ug/L)						
1	8-Aug-17	0.005	1.1	0.0005	0.0005	0.086	0.0005	0.018
2	13-Sep-17	0.006	1.1	0.0005				0.006
3	20-Oct-17	0.011	1.2	0.0005				0.001
4	21-Nov-17	0.01	0.99	0.0005				0.0005
5	5-Dec-17	0.01	1.1	0.0005				0.0005
6	19-Jan-18	0.04	1.4	0.0005				0.008
7	8-Jan-20	0.0005		0.0005		0.22	0.0005	0.0005
8	30-Mar-20	0.0005	1.73	0.0005		0.05	0.0005	0.0005
9	15-Jul-20	0.01	1.46	0.0005	0.0005	0.04	0.0005	0.01
10	21-Sep-20	0.0005	1.44	0.0005	0.0005	0.15	0.0005	0.0005
11	15-Dec-20	0.0005	1.06	0.0005	0.0005	0.05	0.0005	0.0005
12	15-Mar-21	0.0005	1.24	0.0005	0.0005	0.3	0.0005	0.0005
13	9-Jun-21	0.0005	1.27	0.0005	0.0005	0.16	0.0005	0.0005
14	30-Aug-21	0.0005	1.74	0.0005	0.0005	0.13	0.0005	0.0005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.54	0.19	0.00	0.00	0.66	0.00	1.56
Mann-Kendall Statistic (S):		-35	29	0	0	5	0	-33
Confidence Factor:		96.9%	95.6%	47.8%	37.9%	65.7%	46.0%	96.0%
Concentration Trend:		Decreasing	Increasing	Stable	Stable	No Trend	Stable	Decreasing



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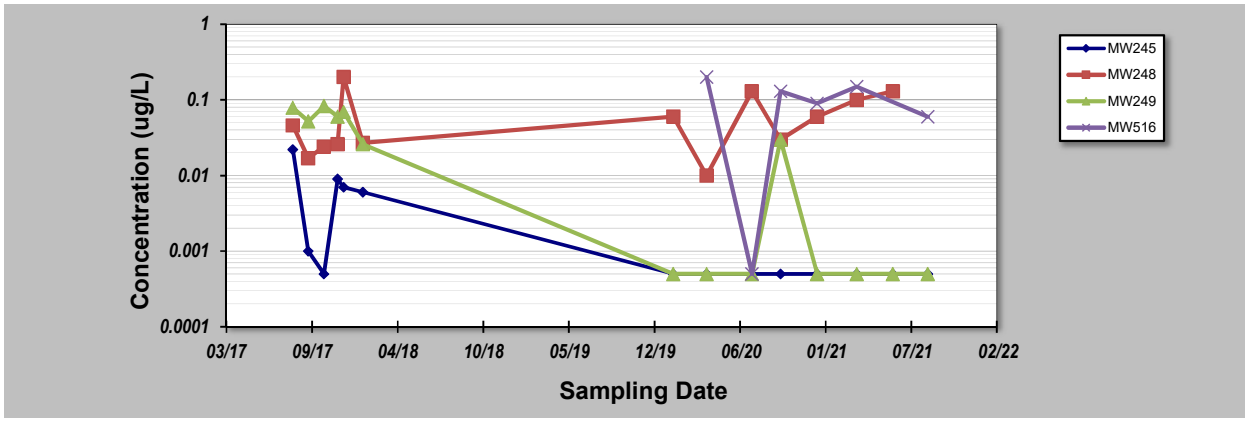
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - AVCAT storage…	Constituent:	PFOA
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW245	MW248	MW249	MW516			
Sampling Event	Sampling Date	PFOA CONCENTRATION (ug/L)						
1	8-Aug-17	0.022	0.046	0.079				
2	13-Sep-17	0.001	0.017	0.052				
3	20-Oct-17	0.0005	0.024	0.083				
4	21-Nov-17	0.009	0.026	0.06				
5	5-Dec-17	0.007	0.2	0.069				
6	19-Jan-18	0.006	0.027	0.026				
7	14-Jan-20	0.0005	0.06	0.0005				
8	1-Apr-20	0.0005	0.01	0.0005	0.2			
9	16-Jul-20	0.0005	0.13	0.0005	0.0005			
10	21-Sep-20	0.0005	0.03	0.03	0.13			
11	15-Dec-20	0.0005	0.06	0.0005	0.09			
12	18-Mar-21	0.0005	0.1	0.0005	0.15			
13	10-Jun-21	0.0005	0.13	0.0005				
14	31-Aug-21	0.0005		0.0005	0.06			
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.72	0.87	1.15	0.67			
Mann-Kendall Statistic (S):		-43	30	-52	-3			
Confidence Factor:		99.0%	96.2%	99.8%	64.0%			
Concentration Trend:		Decreasing	Increasing	Decreasing	Stable			



Notes:

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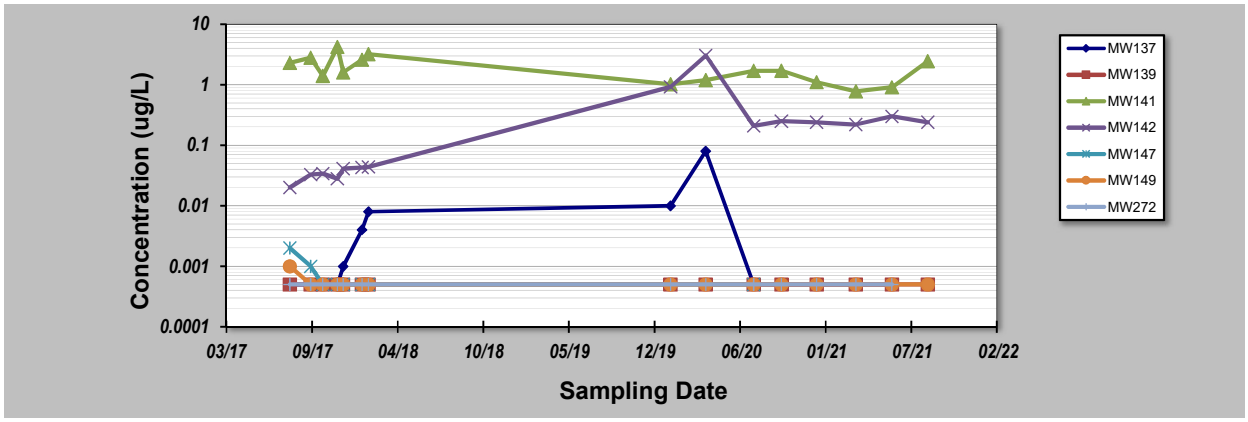
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling Demolition Ground	Constituent:	PFOA
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW137	MW139	MW141	MW142	MW147	MW149	MW272
Sampling Event	Sampling Date	PFOA CONCENTRATION (ug/L)						
1	1-Aug-17	0.0005	0.0005	2.3	0.02	0.002	0.001	0.0005
2	19-Sep-17	0.0005	0.0005	2.8	0.033	0.001	0.0005	0.0005
3	17-Oct-17	0.0005	0.0005	1.4	0.034	0.0005	0.0005	0.0005
4	20-Nov-17	0.0005	0.0005	4.2	0.028	0.0005	0.0005	0.0005
5	4-Dec-17	0.001	0.0005	1.6	0.041	0.0005	0.0005	0.0005
6	17-Jan-18	0.004	0.0005	2.6	0.043	0.0005	0.0005	0.0005
7	1-Feb-18	0.008	0.0005	3.2	0.044	0.0005	0.0005	0.0005
8	8-Jan-20	0.01	0.0005	1.02	0.92		0.0005	0.0005
9	30-Mar-20	0.08	0.0005	1.19	3.04		0.0005	0.0005
10	20-Jul-20	0.0005	0.0005	1.71	0.21	0.0005	0.0005	0.0005
11	23-Sep-20	0.0005	0.0005	1.71	0.25		0.0005	0.0005
12	14-Dec-20	0.0005	0.0005	1.1	0.24		0.0005	0.0005
13	16-Mar-21	0.0005	0.0005	0.78	0.22		0.0005	0.0005
14	8-Jun-21	0.0005	0.0005	0.91	0.3		0.0005	0.0005
15	31-Aug-21		0.0005	2.47	0.24		0.0005	
16								
17								
18								
19								
20								
Coefficient of Variation:		2.74	0.00	0.50	2.04	0.71	0.24	0.00
Mann-Kendall Statistic (S):		5	0	-36	66	-13	-14	0
Confidence Factor:		58.5%	48.0%	95.9%	>99.9%	92.9%	73.7%	47.8%
Concentration Trend:		No Trend	Stable	Decreasing	Increasing	Prob. Decreasing	Stable	Stable



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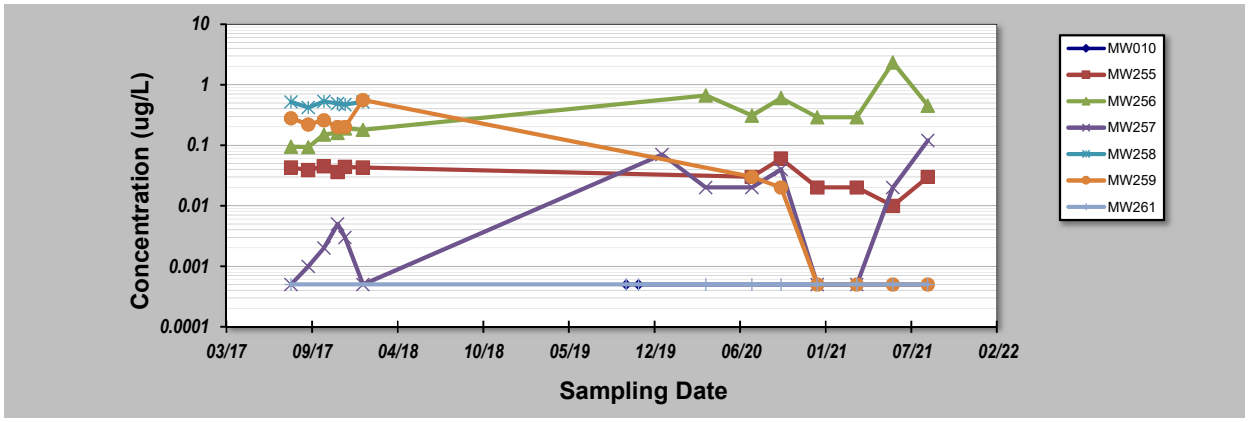
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - Fire Stn, dredge spoil…	Constituent:	PFOA
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW010	MW255	MW256	MW257	MW258	MW259	MW261
Sampling Event	Sampling Date	PFOA CONCENTRATION (ug/L)						
1	4-Aug-17		0.043	0.095	0.0005	0.52	0.28	0.0005
2	13-Sep-17		0.039	0.093	0.001	0.42	0.22	
3	20-Oct-17		0.045	0.15	0.002	0.53	0.26	
4	21-Nov-17		0.036	0.16	0.005	0.49	0.2	
5	8-Dec-17		0.044	0.19	0.003	0.47	0.2	
6	19-Jan-18		0.043	0.18	0.0005	0.52	0.56	
7	26-Sep-19	0.0005						0.0005
8	25-Oct-19	0.0005						0.0005
9	19-Dec-19				0.07			
10	30-Mar-20			0.67	0.02			0.0005
11	16-Jul-20		0.03	0.31	0.02		0.03	0.0005
12	22-Sep-20		0.06	0.6	0.04		0.02	0.0005
13	16-Dec-20	0.0005	0.02	0.29	0.0005		0.0005	0.0005
14	18-Mar-21	0.0005	0.02	0.29	0.0005		0.0005	0.0005
15	10-Jun-21	0.0005	0.01	2.34	0.02		0.0005	0.0005
16	31-Aug-21	0.0005	0.03	0.45	0.12		0.0005	0.0005
17								
18								
19								
20								
Coefficient of Variation:		0.00	0.39	1.33	1.60	0.08	1.17	0.00
Mann-Kendall Statistic (S):		0	-29	51	30	0	-47	0
Confidence Factor:		39.3%	97.4%	100.0%	94.4%	39.3%	>99.9%	45.6%
Concentration Trend:		Stable	Decreasing	Increasing	Prob. Increasing	Stable	Decreasing	Stable



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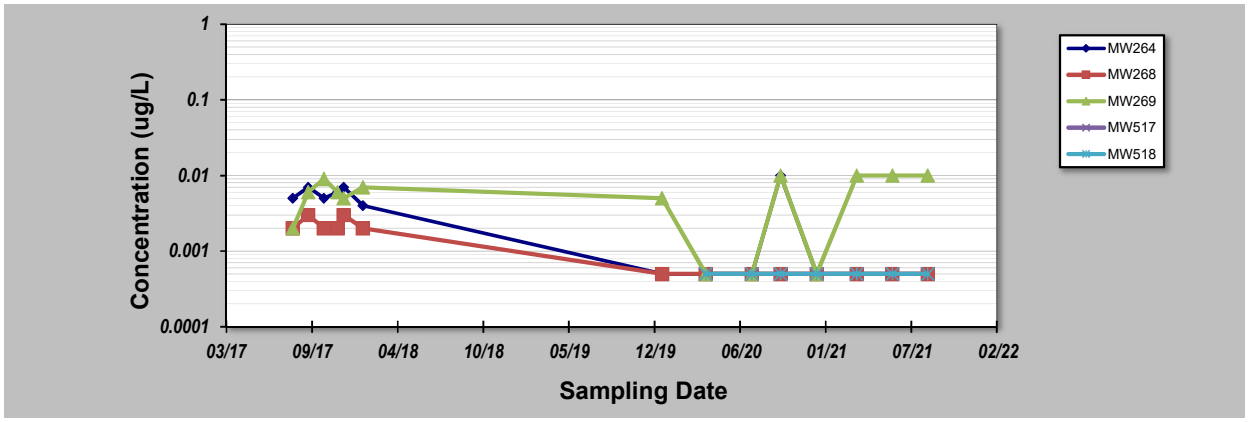
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - Fire Stn, dredge spoil…	Constituent:	PFOA
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW264	MW268	MW269	MW517	MW518		
Sampling Event	Sampling Date	PFOA CONCENTRATION (ug/L)						
1	8-Aug-17	0.005	0.002	0.002				
2	13-Sep-17	0.007	0.003	0.006				
3	20-Oct-17	0.005	0.002	0.009				
4	21-Nov-17	0.006	0.002	0.006				
5	5-Dec-17	0.007	0.003	0.005				
6	19-Jan-18	0.004	0.002	0.007				
7	19-Dec-19	0.0005	0.0005	0.005				
8	30-Mar-20	0.0005	0.0005	0.0005	0.0005	0.0005		
9	16-Jul-20	0.0005	0.0005	0.0005	0.0005	0.0005		
10	21-Sep-20	0.01	0.0005	0.01	0.0005	0.0005		
11	14-Dec-20	0.0005	0.0005	0.0005	0.0005	0.0005		
12	18-Mar-21	0.0005	0.0005	0.01	0.0005	0.0005		
13	9-Jun-21	0.0005	0.0005	0.01	0.0005	0.0005		
14	31-Aug-21	0.0005	0.0005	0.01	0.0005	0.0005		
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.97	0.77	0.64	0.00	0.00		
Mann-Kendall Statistic (S):		-38	-48	18	0	0		
Confidence Factor:		97.9%	99.6%	82.1%	37.9%	37.9%		
Concentration Trend:		Decreasing	Decreasing	No Trend	Stable	Stable		



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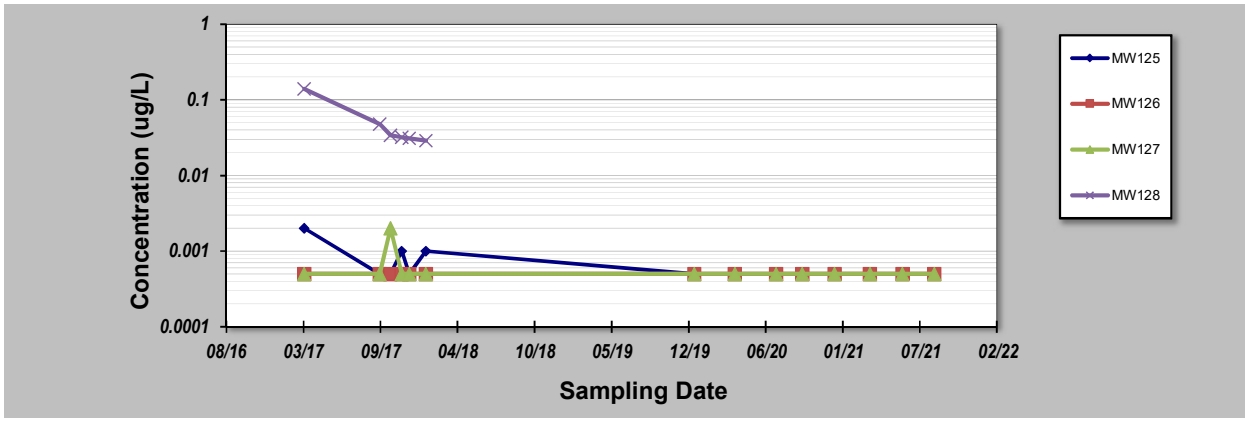
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - FTA	Constituent:	PFOA
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW125	MW126	MW127	MW128			
Sampling Event	Sampling Date	PFOA CONCENTRATION (ug/L)						
1	8-Mar-17	0.002	0.0005	0.0005	0.14			
2	20-Sep-17	0.0005	0.0005	0.0005	0.048			
3	18-Oct-17	0.0005	0.0005	0.002	0.034			
4	16-Nov-17	0.001	0.0005	0.0005	0.032			
5	6-Dec-17	0.0005	0.0005	0.0005	0.031			
6	18-Jan-18	0.001	0.0005	0.0005	0.029			
7	16-Dec-19	0.0005	0.0005	0.0005				
8	30-Mar-20	0.0005	0.0005	0.0005				
9	15-Jul-20	0.0005	0.0005	0.0005				
10	21-Sep-20	0.0005	0.0005	0.0005				
11	14-Dec-20	0.0005	0.0005	0.0005				
12	16-Mar-21	0.0005	0.0005	0.0005				
13	8-Jun-21	0.0005	0.0005	0.0005				
14	30-Aug-21	0.0005	0.0005	0.0005				
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.62	0.00	0.66	0.83			
Mann-Kendall Statistic (S):		-25	0	-9	-15			
Confidence Factor:		90.4%	47.8%	66.6%	99.9%			
Concentration Trend:		Prob. Decreasing	Stable	Stable	Decreasing			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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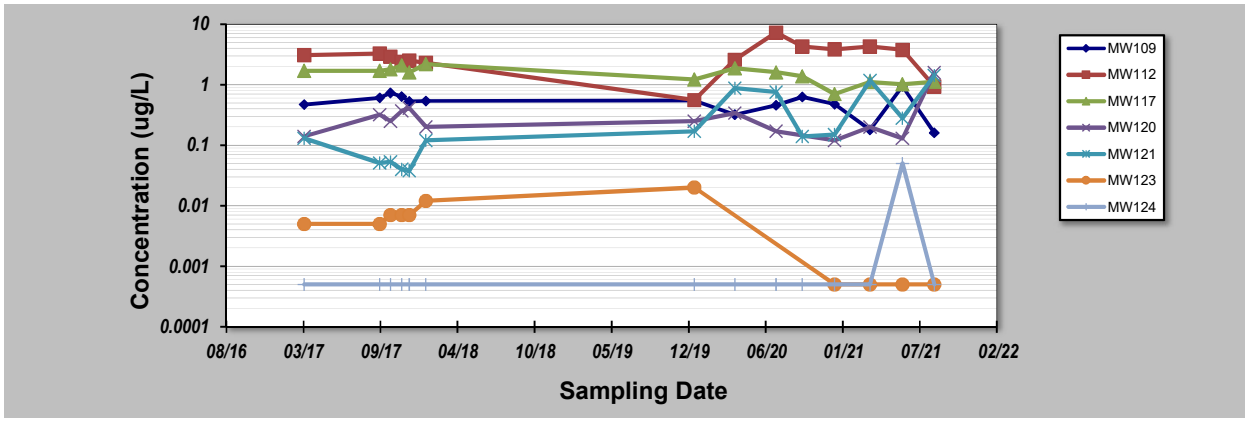
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - FTA	Constituent:	PFOA
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW109	MW112	MW117	MW120	MW121	MW123	MW124
Sampling Event	Sampling Date	PFOA CONCENTRATION (ug/L)						
1	8-Mar-17	0.47	3.1	1.7	0.14	0.13	0.005	0.0005
2	20-Sep-17	0.61	3.3	1.7	0.32	0.051	0.005	0.0005
3	18-Oct-17	0.73	2.9	1.8	0.25	0.053	0.007	0.0005
4	16-Nov-17	0.64	2.4	2.1	0.37	0.04	0.007	0.0005
5	6-Dec-17	0.53	2.5	1.6	0.41	0.038	0.007	0.0005
6	18-Jan-18	0.54	2.3	2.2	0.2	0.12	0.012	0.0005
7	16-Dec-19	0.55	0.56	1.22	0.25	0.17	0.02	0.0005
8	30-Mar-20	0.32	2.58	1.88	0.34	0.88		0.0005
9	15-Jul-20	0.46	7.3	1.6	0.17	0.76		0.0005
10	21-Sep-20	0.63	4.3	1.38		0.14		0.0005
11	14-Dec-20	0.48	3.84	0.7	0.12	0.15	0.0005	0.0005
12	16-Mar-21	0.18	4.28	1.11	0.2	1.18	0.0005	0.0005
13	8-Jun-21	0.94	3.76	1.02	0.13	0.28	0.0005	0.05
14	30-Aug-21	0.16	0.94	1.12	1.59	1.42	0.0005	0.0005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.40	0.52	0.29	1.12	1.21	1.01	3.28
Mann-Kendall Statistic (S):		-23	5	-45	-8	51	-11	11
Confidence Factor:		88.3%	58.5%	99.3%	66.2%	99.8%	77.7%	70.5%
Concentration Trend:		Stable	No Trend	Decreasing	No Trend	Increasing	No Trend	No Trend



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
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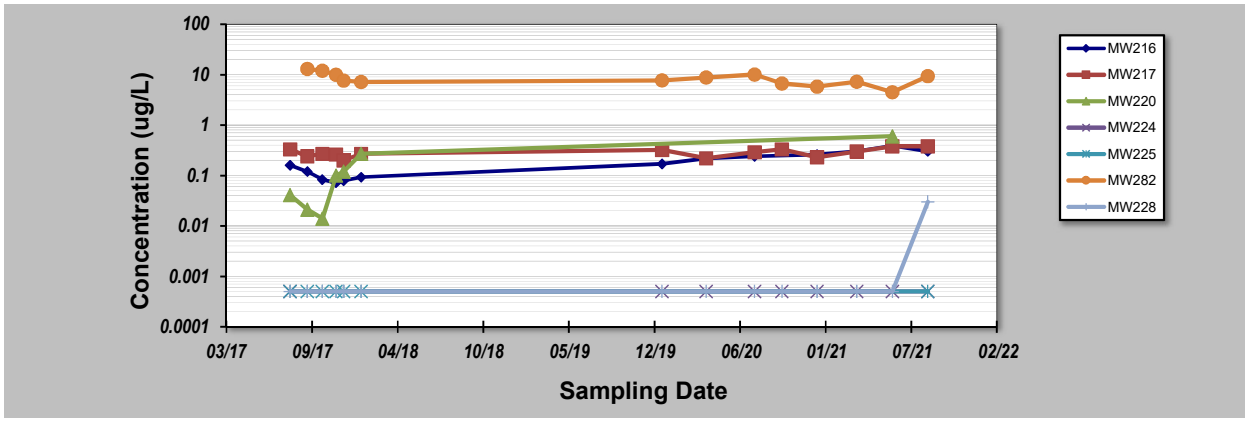
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - HSF	Constituent:	PFOA
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW216	MW217	MW220	MW224	MW225	MW282	MW228
Sampling Event	Sampling Date	PFOA CONCENTRATION (ug/L)						
1	2-Aug-17	0.16	0.33	0.041	0.0005	0.0005		0.0005
2	11-Sep-17	0.12	0.24	0.021		0.0005	13	0.0005
3	16-Oct-17	0.083	0.27	0.014		0.0005	12	0.0005
4	17-Nov-17	0.072	0.26	0.1		0.0005	10	0.0005
5	5-Dec-17	0.079	0.2	0.12		0.0005	7.6	0.0005
6	15-Jan-18	0.093	0.27	0.27		0.0005	7.2	0.0005
7	19-Dec-19	0.17	0.32		0.0005		7.7	0.0005
8	31-Mar-20	0.22	0.22		0.0005		8.84	0.0005
9	22-Jul-20	0.24	0.29		0.0005		10.1	0.0005
10	24-Sep-20		0.33		0.0005		6.69	0.0005
11	15-Dec-20	0.26	0.23		0.0005		5.77	0.0005
12	18-Mar-21	0.3	0.3		0.0005		7.28	0.0005
13	9-Jun-21	0.39	0.38	0.6	0.0005		4.5	0.0005
14	31-Aug-21	0.3	0.38		0.0005	0.0005	9.37	0.03
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.54	0.20	1.26	0.00	0.00	0.28	3.02
Mann-Kendall Statistic (S):		53	30	15	0	0	-36	13
Confidence Factor:		>99.9%	94.4%	98.5%	46.0%	37.9%	98.5%	74.1%
Concentration Trend:		Increasing	Prob. Increasing	Increasing	Stable	Stable	Decreasing	No Trend



Notes:

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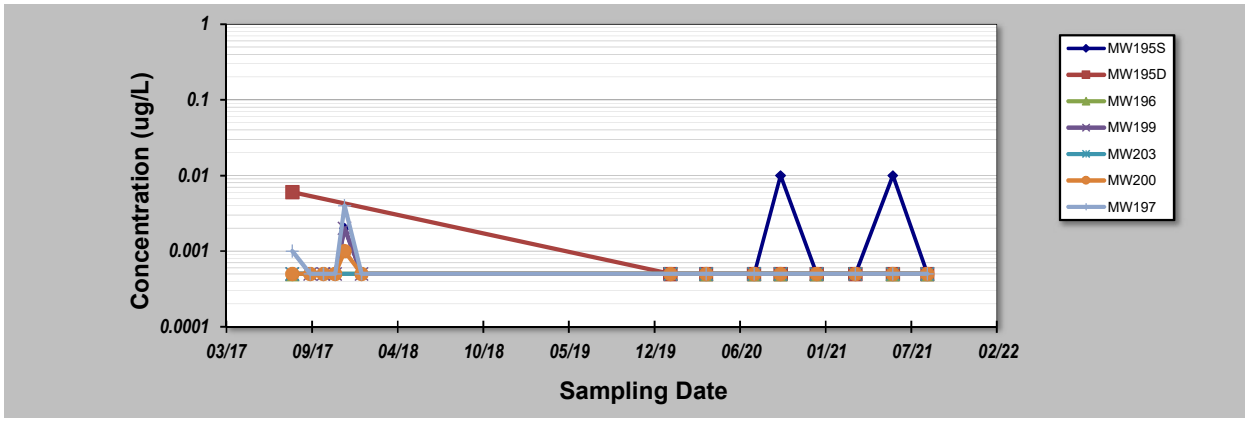
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - WWTP	Constituent:	PFOA
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW195S	MW195D	MW196	MW199	MW203	MW200	MW197
Sampling Event	Sampling Date	PFOA CONCENTRATION (ug/L)						
1	7-Aug-17	0.0005	0.006	0.0005	0.0005	0.0005	0.0005	0.001
2	18-Sep-17	0.0005			0.0005		0.0005	0.0005
3	19-Oct-17	0.0005			0.0005		0.0005	0.0005
4	15-Nov-17	0.0005			0.0005		0.0005	0.0005
5	7-Dec-17	0.002			0.002		0.001	0.004
6	16-Jan-18	0.0005			0.0005		0.0005	0.0005
7	8-Jan-20	0.0005	0.0005		0.0005	0.0005	0.0005	
8	31-Mar-20	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
9	21-Jul-20	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
10	21-Sep-20	0.01	0.0005	0.0005	0.0005	0.0005	0.0005	
11	14-Dec-20	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	
12	15-Mar-21	0.0005	0.0005			0.0005	0.0005	0.0005
13	10-Jun-21	0.01	0.0005	0.0005		0.0005	0.0005	0.0005
14	30-Aug-21	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.74	1.65	0.00	0.69	0.00	0.25	1.22
Mann-Kendall Statistic (S):		13	-8	0	-3	0	-5	-11
Confidence Factor:		74.1%	76.2%	37.9%	55.4%	46.0%	58.5%	77.7%
Concentration Trend:		No Trend	No Trend	Stable	Stable	Stable	Stable	No Trend



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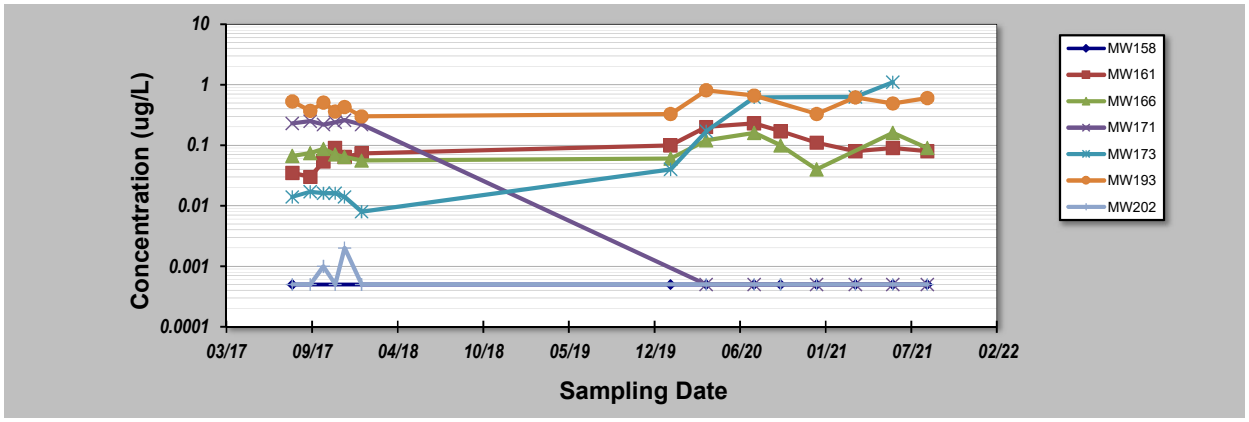
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	Nov-21	Job ID:	DEF19009
Facility Name:	HMAS Stirling - WWTP	Constituent:	PFOA
Conducted By:	Cardno	Concentration Units:	ug/L

Sampling Point ID:	MW158	MW161	MW166	MW171	MW173	MW193	MW202
Sampling Event	Sampling Date	PFOA CONCENTRATION (ug/L)						
1	7-Aug-17	0.0005	0.035	0.067	0.23	0.014	0.53	0.0005
2	18-Sep-17		0.03	0.074	0.25	0.017	0.37	0.0005
3	19-Oct-17		0.054	0.087	0.22	0.016	0.51	0.001
4	15-Nov-17		0.091	0.07	0.24	0.016	0.36	0.0005
5	7-Dec-17		0.064	0.064	0.26	0.014	0.43	0.002
6	16-Jan-18		0.073	0.056	0.22	0.008	0.3	0.0005
7	8-Jan-20	0.0005	0.1	0.06		0.04	0.33	
8	31-Mar-20	0.0005	0.2	0.12	0.0005	0.17	0.81	0.0005
9	21-Jul-20	0.0005	0.23	0.16	0.0005	0.62	0.66	0.0005
10	21-Sep-20	0.0005	0.17	0.1				0.0005
11	14-Dec-20	0.0005	0.11	0.04	0.0005		0.33	0.0005
12	15-Mar-21	0.0005	0.08		0.0005	0.63	0.62	0.0005
13	10-Jun-21	0.0005	0.09	0.16	0.0005	1.1	0.49	0.0005
14	30-Aug-21	0.0005	0.08	0.09	0.0005		0.6	0.0005
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.00	0.59	0.43	1.04	1.55	0.32	0.65
Mann-Kendall Statistic (S):		0	36	13	-36	33	7	-11
Confidence Factor:		46.0%	97.3%	76.4%	99.3%	99.5%	64.0%	72.5%
Concentration Trend:		Stable	Increasing	No Trend	Decreasing	Increasing	No Trend	Stable



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